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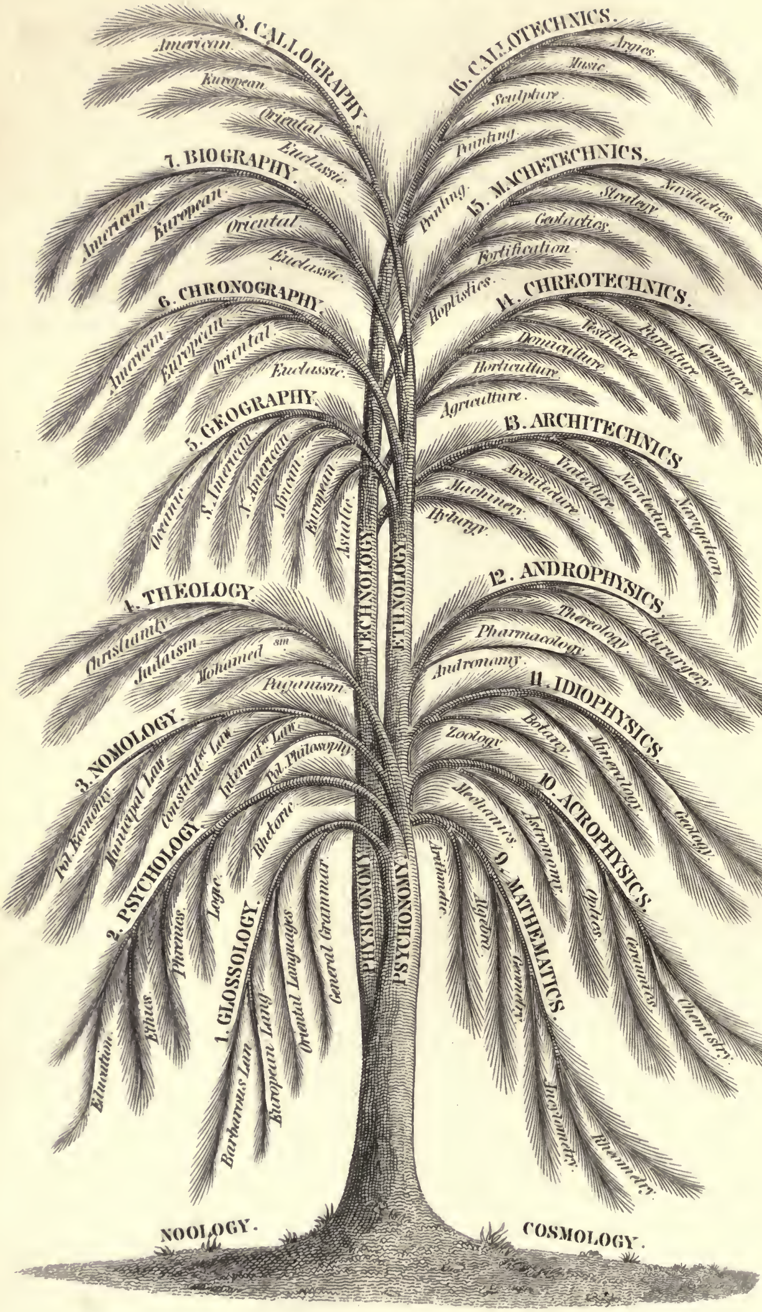

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PANTOLOGY;

OR,

A SYSTEMATIC SURVEY

OF

HUMAN KNOWLEDGE;

PROPOSING

A CLASSIFICATION OF ALL ITS BRANCHES, AND ILLUSTRATING THEIR HISTORY, RELATIONS, USES, AND OBJECTS;

WITH A

Synopsis of their Leading Facts and Principles;

AND

A Select Catalogue of Books on all Subjects,

SUITABLE FOR A CABINET LIBRARY:

THE WHOLE DESIGNED AS A

GUIDE TO STUDY FOR ADVANCED STUDENTS, IN COLLEGES, ACADEMIES, AND SCHOOLS; AND AS A POPULAR DIRECTORY IN LITERATURE, SCIENCE, AND THE ARTS.

BY ROSWELL PARK, A. M.,

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30 NORTH FOURTH STREET.

1841.

TO THE

REV. SAMUEL B. WYLIE, D.D.

VICE PROVOST AND PROFESSOR OF LANGUAGES,

IN THE

UNIVERSITY OF PENNSYLVANIA,

WHOSE LIFE HAS BEEN DEVOTED TO THE ADVANCEMENT OF LEARNING
AND THE INTERESTS OF HUMANITY,

THIS WORK

IS

WITH HIS PERMISSION

MOST RESPECTFULLY AND AFFECTIONATELY DEDICATED.

PREFACE.

The present work is offered, as a guide book, to those who are seeking to explore the vast expanse of human knowledge. It aspires to be to *Pantology*, or knowledge in general, what a map of the world is to Geography: an outline, and nothing more: but such an outline as may be serviceable to all who are seeking to acquire general views of this wide region; by showing, however imperfectly, the relations of its parts, and their comparative extent and importance. And as the emigrant, who proposes to settle in a new country, first travels over it, and examines its different regions, before selecting a location; so, it is believed, may the student, before choosing a profession, derive benefit from a general survey of all the regions of knowledge, such as is here attempted to be presented. Or, as the traveller, in pursuit of health and pleasure, does not rest satisfied with his native state, rich and fruitful though it be; so may the philosopher derive strength and relaxation from an occasional excursion beyond his own immediate pursuits, or a systematic tour around the whole intellectual world.

The primary object of the following pages, was to present a *Natural Classification* of human knowledge, so full as to furnish a place for every topic of thought, and so simple that it might be of general and practical application. It would thus include what Sir James Mackintosh so appropriately terms an "*Exhaustive Analysis*" of Human Knowledge; in which all the fragments, even of minor importance, would find a distinct and proper place. It would also serve as a *Mnemonical System*, to aid in impressing and retaining ideas; as an *Index Rerum*, or method of arranging topics of study; and as a *Model for Libraries*, by bringing those books which relate to the same subjects, into juxtaposition, whether in the catalogues, or on the shelves. Such a classification, it is futher conceived, would be the best of all arrangements for *Encyclopædias:* the whole advantage of their usual form, being still preserved, by means of a copious alphabetical index; while they would exhibit the information which they contain, in a connected and systematic manner.

But while proposing a *classification* of Human Knowledge, it seemed to the writer that its value would be greatly enhanced, and better appreciated, if connected with a brief *summary* of the knowledge which it was proposed to classify. The attempt has therefore here been made, to present such leading ideas of each branch, as would give just views of its nature, extent, and relative importance; thus in some degree gratifying curiosity, while stimulating it to farther inquiries. Conscious, however, of the imperfect manner in which this has been done, the writer has appended a bibliographical catalogue, drawn up with great care, and referring to a few of the best authors, as far as he could ascertain, in each branch of knowledge; whose works, if carefully perused, will amply supply any deficiencies, and correct any occasional faults or errors in this. It is hoped that such a catalogue, however incomplete, from the very nature of the undertaking, may be of real assistance to those who are seeking the best books, either to read or to purchase, for themselves or for Libraries.

Although this work is especially intended for advanced Students, who are about leaving our Colleges, Academies, or Schools, it seeks also to be useful, even to those who have entered the full career of life; by recalling elementary facts, and adding such reflections on the various topics glanced over, as will impress them most strongly upon the mind. In short, to convey accurate views of general knowledge, in a methodical and attractive form, and to apply that knowledge philosophically and practically, has been the writer's constant aim: but how far he has succeeded therein, a candid public can alone decide.

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INTRODUCTION.

CHAPTER I.

SUBJECTS OF HUMAN KNOWLEDGE.

The intelligent Reader, whose eye these pages may reach, has doubtless already been led to reflect on the great variety and vast extent of human knowledge. In the country, he has probably observed the wondrous works of nature, fresh from the hand of their Divine Author; and in the city, he has viewed those works, modified, in a thousand ways, by the less plastic labors of art. In society, he has probably studied mankind in their diversified aspects; and in solitude, has endeavoured to know himself, and to trace his origin, and that of all created things, back through the range of time, and upward through the chain of secondary causes, to the first and sole Great Cause of all. To such Readers, a review of these various subjects,—so classified as to show their mutual relations or dependencies, and accompanied by some distinct views of their facts and principles, history and uses,—cannot fail to be interesting, if not entertaining.

We will commence by reconnoitring the field of knowledge, that we may afterward survey it in a more methodical manner. *Mind* and *matter*, active or passive, separate or combined, form the subjects of all our ideas; body and spirit being the only modes of existence with which we are acquainted. The mind is of course concerned in the acquisition of all human knowledge; so that the study of matter is distinct from mind, only as regards the objects which are studied. And as we cannot comprehend the *nature* or essence of our own *minds*, neither can we understand the nature of *matter*, nor the mode nor the origin of its existence; but only its phenomena and properties, so far as they are discoverable by the agency of our senses.

In examining the properties of matter, we have frequent occasion to measure distances, bulks, or weights; and to express the same by numbers, with reference to some standard unit; as five miles, ten cubic feet, or fifteen pounds. To express and compare these numbers, in various ways, was the object of *Arithmetic:* and to represent unknown numbers by symbols, and afterwards discover their value from their relations to certain known numbers, was the higher office of *Algebra.* It was also found desirable sometimes to express quantities by extent or magnitude, having particular reference to figure or shape: and hence the origin of *Geometry.* The application of numbers to measure various figures and curves, was a still higher step in these auxiliary sciences; and the mode of discovering the relations of mutually dependent quantities, by supposing them to vary, and observing their relative changes, was the last and highest step in *Mathematics*.

In analyzing the material world, we first observe the great distinction between animate and inanimate bodies: the latter having no innate principle of life, nor power to move or act, or cease from action, except when influenced by some external cause, or force. The study of these forces and their laws of action is the object of *Natural Philosophy;* which shows us, that light, heat, and electricity,—even clouds and storms, lightning and thunder,—are all subject to the same general laws; and that the stars of heaven, rolling on through countless ages, with the earth itself, the star which we inhabit, obey, in all their motions, the simple law of gravitation, which causes the uplifted stone to fall to the ground. Before leaving inanimate matter, it remains to consider its composition: and we find in it an immense variety of compounds, all resulting from a few simple elements. This leads to the study of the means by which those elements may be compounded or disunited, with the nature and uses both of the elements and of their compounds; in all of which consists the science of *Chemistry*.

In studying animated nature, we find a principle of life, modifying the laws of inanimate matter. Hence we have a new class of phenomena, in the origin, growth, and decay of organic bodies, whether plants or animals; and hence a higher interest attaches to the studies of *Botany* and *Zoology*. In the animal races, we find an additional principle of life, inciting them to action, and though far inferior, yet in many respects similar to the human intellect. This principle becomes more prominent, as we rise to the higher orders of animals; and as they approach the human race in outward form and physical constitution. The fact that many of these organic forms are found buried in the depths of the earth, here arrests our attention; and leads us to investigate the structure of our globe; first in its homogeneous elements, and afterwards in their massive aggregations. Hence arose the sciences of *Mineralogy* and *Geology;* which, in connection with those relating to organic life, complete the range of *Natural History*.

Man, being essentially compounded of mind and matter, seems to form the great connecting link between the material and the spiritual world. Considering his material nature, we are first led to study the structure of the human body; especially as affording the means of detecting the diseases to which it is liable, and suggesting their appropriate remedies. If the study of *Medicine* originally preceded that of *Anatomy* and *Physiology*, it could have made but little progress until these studies were considerably advanced, and some theoretical views adopted concerning the action of remedial agents, by which they might be classified and compared. The *Art of Healing* was thus improved empirically, until it became a science; resting on acknowledged principles, though of difficult application: and the introduction of mechanical agency, or the practice of *Surgery*, rendered its functions complete.

The human body, owing to its physical constitution, requires shelter, food, and clothing: to supply which, has exercised the ingenuity, and incited the labors of the greater portion of our race. Hence have arisen the *Arts of Construction* and *Conveyance;* by which not only man himself, but the objects to which he attaches the greatest value, may be protected from the elements; or transported from place to place, though mountains rear their crests, or oceans roll between. Hence *Agriculture*, *Manufactures*, and *Commerce*, have sprung from the bosom of the earth; and with linked hands, and united labors, they have increased and developed the productions of nature, or moulded and modified them, to suit the wants of humanity:—then sent them forth into all lands, in exchange for other commodities; until the world has become as it were a family of nations, each engaged in contributing to the general welfare.

Unhappily for the cause of human improvement, this concord is liable to interruptions; when nations, like individuals, yield to their angry passions, and, deaf to the voice of reason and justice, rush to the battle field;—far oftener, to gratify their unhallowed ambition, or to avenge fancied wrongs, than to defend the sacred cause of freedom. Thus, the *Arts of War* have become a part of human knowledge, necessary in self-defence; though for this sacred object alone can we deem their practice justifiable, or allowable. By their potent aid, a feeble nation, though powerless to carry its attacks abroad, and commit aggressions upon others, may yet be strong to resist aggressions, amid its mountain fastnesses, or behind its fortified walls. Thus provided and protected, the human mind gives scope to other wants, more refined and intellectual; and in the assemblage of beautiful forms, rich colors, harmonious sounds, and graceful exercises, it seeks for occupation and amusement. To leisure, inspired by genius, and guided by taste, do the *Fine Arts*, the last which relate to material objects, owe their interest, and their being.

Considered intellectually, man was evidently destined for a state of society: and hence the gift of speech was bestowed, which so far exalts him above the brute creation. The cultivation of this faculty, led to the study of *Grammar*, and of the various *Languages* which have arisen among men; emanations, doubtless, from one primitive tongue. By their aid, history has recorded its facts; philosophy, its speculations; science, its principles; and art, its processes: in short, by their aid, most of the knowledge has been preserved and diffused, which forms the boast and distinction of our race. From the means of communicating our thoughts, we naturally ascend to the source from which they spring: and thus we arrive at the study of the human mind, with its varied faculties and relations; which collectively form the subject of the *Mental Sciences;* including Rhetoric, Logic, Mental and Moral Philosophy, and Education.

Regarded as social beings, we owe certain duties to our fellow-men, and claim certain rights from them in return. The enforcement of these duties, and the preservation of these rights, is found to require the exercise of power, lodged in some proper hands. Hence governments have originated, and laws been framed; the study of which has expanded into the extensive, and important science of *Jurisprudence;* associated with Politics and Political Economy. Again, viewing man in relation to his Creator, new duties arise, which indeed include all the others; and of which a right understanding is essential, both to our present and future happiness. Hence the origin of *Theology;* in whose sublime inquiries, the light of nature is aided by the light of Revelation, shining on the straight and narrow path to life eternal. Beyond this light, and up to the higher orders of being, darkness still surrounds us; and probably it will continue, until this mortal shall put on immortality, and this dawn give place to perfect day.

The principles involved in these intellectual sciences, find their application, as well as their illustration, in the study of mankind at large,—nations and individuals. This study naturally commences with *Geography*, or a description of the earth and its inhabitants: tracing their locations; manners and customs; resources and improvements; as derived from statistical records, and the accounts of Voyagers and Travellers. From Geography we naturally proceed to *History:* whose voluminous records display the varied fate of nations, during the lapse of time; unfolding the causes of their rise and advancement, or of their decline and destruction: thus proving that pure religion and virtue are the only safeguards of a state; while wealth, producing luxury, is a temptation to invasions from abroad and dissensions within.

The study of nations is greatly elucidated, by tracing the career of those remarkable individuals, who have guided the current of public events, or opened new fountains of knowledge; and thereby stamped their character upon their own times, or exerted an influence upon succeeding ages. Thus, *Biography* supplies those details which are beyond the limits of History; and each aids the other in exhibiting a full picture of human nature, both in its darker and its brighter aspects. This picture may also be seen by reflected light, in the pages of *Poetry and Romance:* which represent human character and actions according to the ideas of the poet and the novelist: often imbodying the shadowy forms of fancy, as well as the sober realities of truth; while showing, as in a mirror, the views which they have entertained of life, in all its vicissitudes. Their writings possess various degrees of merit; but a selection from the best of them can by no means be omitted, in completing the cycle of human knowledge.

Thus, passing from the material to the intellectual world, we have glanced hastily over the most prominent of those subjects, for the arrangement and examination of which, the present work was undertaken. If this survey has been too brief, to give an adequate idea of the object in view, it should be remembered that the greatest objects appear small, when seen in distant perspective. Could a volume be substituted for every page of the present work, it would still be insufficient to contain the sum total of human knowledge; the most important points of which may yet be comprehended in a single tome; as the widest landscape may be seen through a single pane of glass.

CHAPTER II.

SOURCES OF HUMAN KNOWLEDGE.

Of all the information which we possess, a large, if not the larger portion, is derived, either directly or indirectly, from our fellow-men. Hence arises the distinction between original and communicated knowledge; founded on the manner in which it is obtained. The term *original knowledge*, strictly applies to that which was first discovered by its possessor; being previously unknown to any person whatever: while such knowledge as has been derived from others, but afterwards verified by ourselves, may properly be called *personal knowledge*, though it be not original. The knowledge of events, which we acquire from others, and which, owing to their transient nature, can be verified or proved only by testimony, may be distinguished as *historical;* in contradistinction from which, the knowledge of general facts may be called *experimental;* and the knowledge of general principles, obtained by reasoning or calculation, may be termed *scientific.*

We may acquire a personal knowledge of scientific facts, and principles, at any time, by voluntary application: but a personal knowledge of transient events, must, from its nature, be confined to those who witnessed them; though others may know them historically. Another distinction of knowledge, especially in regard to the arts, is that of speculative and practical. *Speculative* knowledge may be communicated, or derived, by study; but *practical* knowledge can only be acquired by an actual performance of the process in question; whatever it may be. Personal knowledge, then, may be acquired by observation or experiment; by reasoning or by calculation: and that knowledge which has been verified by others, as well as by ourselves, is perhaps the most certain of all.

Communicated knowledge may be derived from monuments, statues, coins, or other antiquities; from books or manuscripts, pictures or engravings; and from conversation, gestures, or signals, in immediate intercourse with our fellow-men. Of all these sources of knowledge, books and conversation are, at the present day, much the most important. Conversation may produce the liveliest impressions upon the mind; but those impressions, once effaced, cannot always be restored: while books have the countervailing advantage, that we can recur to them at pleasure, and revive the ideas which they have furnished, although long lost or forgotten. In developing this subject farther, we shall treat, 1. Of the Ancient Schools of Philosophy; 2. Of Modern Learned Societies; 3. Of Libraries; and, 4. Of Encyclopædias.

The Ancient Schools of Philosophy.

Philosophy was formerly understood to comprehend the principles of all human knowledge; or, in the words of Cicero, "the knowledge of things divine and human, and of the causes by which they are governed." It extended therefore to God and spiritual beings; man and all animals; the earth and the starry heavens; matter and mind, and all their properties or attributes. The name *philosopher*, is derived from the Greek, φιλος, a friend or lover; and σοφος, a sage, magus, or wise man. It was introduced by Pythagoras;—who modestly declined the title of sophist, or wise man, but styled himself a lover of the wise, or of wisdom. *Philosophy* has also been defined, "the science of the fundamental truths of human knowledge;" or "the science of reason;" and it has been subdivided into Natural, Mental, Moral, and Metaphysical Philosophy; of which divisions we shall speak hereafter.

In ancient Greece, where knowledge was so much cultivated, it was disseminated, to a great extent, by the oral instructions of the philosophers; and perpetuated by means of the schools, or sects, which they founded. Those schools, considered as sources of knowledge, we may here properly mention. The first of them was the *Ionic school*, or sect, founded by *Thales*, of Miletus, in Ionia, who died about 548 B. C. He taught that water, or rather fluidity, was the great principle of life and activity, throughout nature; and hence he called it the divine principle, or the soul of the world. Having travelled in Egypt, he acquired and even extended the science of geometry; and he is said to have been the first who predicted an eclipse. He taught that the stars were material: but believed in the existence of demons, or spirits, pervading the universe; and ascribed souls to inanimate objects.

The second important school, or sect, was the *Italic*, founded by *Pythagoras*, of Samos, who died about 506 B. C. He travelled in Chaldea and Egypt, and finally retired from Greece, to Magna Græcia, in Italy, where he established his school. He taught that the sun is a great central fire, the principle of warmth and life; that the planets revolving around it must be ten in number, because he regarded ten as a perfect number; and that by dividing the ether in their course, they produced tones, varying with their size, distance, and velocity, which together composed the harmony of the spheres. He believed that the Deity, or Universal Spirit, is in substance similar to light; a monad or unit, from whom gods, demons, heroes, and human souls emanated; and that the human soul consists of two parts, the one residing in the heart, sentient and perishable; the other residing in the brain, rational and immortal; which, on leaving the body, assumes an ethereal vehicle, till it enters some other human or animal body, to be farther purified, before admission to the divine presence.

Contemporary with Pythagoras was *Xenophanes*, who settled about 536 B. C. at Elea, and founded the *Eleatic school.* He maintained that God is the only being; in whom all others are comprehended; and that the variety of forms and objects in nature is not real, but only imaginary. He believed that all things are produced from fire, air, and water; and contended that the moon was inhabited. The *Socratic school* was founded by *Socrates*, of Athens, who died a martyr to virtue and truth, 400 B. C. Rejecting the wild hypotheses and fallacies of the Sophists, or speculative philosophers, he reasoned so profoundly, on science, and especially on morals, and politics, that he has justly been called the father of philosophy. The mode of conveying instruction by asking questions of pupils, and reasoning with them familiarly, is from him called the *Socratic* method.

The *Academic school*, was founded by *Plato;* who was the favorite pupil of Socrates, and who died about 348 B. C. He taught in the grove of Academus, in the suburbs of Athens; maintaining that the human soul is a ray, or emanation, from the Divinity; to which it must again return, when purified from its earthly dross; and that the greatest earthly good consists in the companionship of kindred souls, searching after truth. The *Cynic school* was founded by *Antisthenes;* who flourished about 396 B. C.; and who was chiefly noted for his austerity. The *Cyrenaic school* was founded by *Aristippus* of Cyrene; who flourished about 392 B. C.; and who gave himself up to selfish pleasure. The *Megaric school* was founded by *Euclid* of Megara, who died 424 B. C.; and it was also called the Eristic school, from his fondness for disputation. The last three named schools are of minor importance.

The *Peripatetic school*, was founded by *Aristotle* of Stagira; who was the preceptor of Alexander the Great; and who died 322 B. C. He had been a pupil of Plato, whose doctrines he for the most part adopted, but developed and extended. He wrote on all the branches of knowledge then known; and his writings have exerted a strong influence, even down to modern times. His system of philosophy was long regarded as complete; though now proved to be in some respects erroneous, and in many things deficient. The *Sceptic school* originated with *Pyrrho* of Elis, who flourished about 340 B. C.; and who doubted of every thing, and therefore placed his supreme good in indifference to all things. The *Epicurean sect*, was founded by *Epicurus* of Gargettus, who died 270 B. C. He taught that pleasure was the chief object of life; but placed his pleasure in habits of temperance and beneficence. His doctrines were afterwards grossly corrupted.

The *Stoic sect*, was founded by *Zeno* of Citium, who died 264 B. C. His famous dogma was, that we should live in conformity to nature, and be equally resigned to all events. Finally, the *Eclectic school* of philosophy arose at a much later period; first under *Potamon* of Alexandria, about the date of the Christian era; and afterwards under Ammonius of Alexandria, about A. D. 193. Its original object was to select the best parts of all the previous systems, particularly those of Plato and Aristotle; and to combine them in one harmonious whole: but its tenets were afterward employed as a means of undermining the Christian Religion.

The doctrines of Aristotle, revived and modified, gave rise in the ninth century to the *Scholastic philosophy;* characterized by theological speculations, and metaphysical subtleties; the teachers of which have received the appellation of scholastics or *schoolmen*. The elder scholastics maintained that abstract ideas, expressed by general terms, are real existences, or essences of the things themselves. Hence they were called *Realists*. This dogma was controverted by Roscellinus; who founded the sect of the *Nominalists;* maintaining that general terms are mere words, or abstractions. His opinion was condemned at Soissons, in 1092; but revived, about 1340, by Wm. Occam (Ocham or Ockham); who maintained the doctrine of the Nominalists, in opposition to his preceptor Dun Scotus: and this doctrine ultimately prevailed. It was left for Bacon, Copernicus, Galileo, Gassendi, Descartes, Leibnitz, Bayle, Locke, and Newton, to remove the rubbish with which the schoolmen had encumbered philosophy, and to become the great modern pioneers in the discovery of physical and intellectual truth.

Modern Learned Societies.

The ancient schools of philosophy, have been superseded, in modern times, by associations designed for the cultivation of knowledge; under the names of Academies, Institutes, or Societies. The first of this kind, was established by the emperor Charlemagne, at the suggestion of Alcuin, his preceptor. It was composed chiefly of the nobles of his court; the emperor himself presiding: but after his death it soon fell to decay. Numerous Academies were founded in Italy, by the Greek scholars driven from Constantinople, on its capture by the Turks, in 1453. The *Academia Secretorum Naturae*, instituted at Naples in 1560, for developing the secrets of nature, was suppressed by the papal authority, through jealousy of its influence. The *Academia della Crusca*, or Bran Academy, founded at Florence in 1582, for sifting or purifying the Italian language, is now incorporated in the Royal Florentine Academy. And the *Academia degl' Inquieti*, or Academy of the restless, founded by Manfredi, at Bologna, in 1690, is now united with the *Bononian Institute;* which possesses a superior library, and collection of curiosities. There are also Royal Academies at Naples, and Turin.

In France, the *French Academy* was founded by Cardinal Richelieu, in 1635, chiefly for the improvement of the French language: and the *Royal Academy of Sciences*, was founded by Colbert, in 1666; since which time it has published 139 volumes of its transactions. These, and other institutions, were united, in 1795, at the suggestion of Condorcet, to form the *National Institute.* It was more completely organized by Napoleon, in 1806; ever since which time, it has been patronised by the French government; receiving therefrom an annual appropriation. On the restoration of the Bourbons, in 1816, it was reorganized, with some slight changes; and it now consists of the four following Academies; 1. The French Academy, devoted to the French language and literature; 2. The Academy of Inscriptions and Belles Lettres, devoted chiefly to antiquities; 3. The Academy of Physical and Mathematical Sciences; and 4. the Academy of the Fine Arts.

In Germany, the *Academia Naturae Curiosorum*, was founded by Bausch, in 1652, and patronized by the Emperor Leopold, in 1687. It is devoted more particularly to the natural and medical sciences; and is located at Vienna. *The Royal Academy of Sciences and Belles Lettres*, at Berlin, was founded in 1700, by Frederick I.; Leibnitz being its first president. It is subdivided into classes; provided with a full cabinet and library; and has acquired a high reputation. There are also Academies of Sciences at Munich, Göttingen, Giessen, and Manheim; the last founded by Charles Theodore, elector palatine. To these we may add the German Association of Physicians and Naturalists; founded in 1822. There are *Royal Academies*, at St. Petersburg, founded in 1725; at Stockholm, founded in 1739; at Copenhagen, 1742; at Brussels, 1772; and at Madrid, founded in 1714: and at Lisbon, there are Royal Academies both of History, and of Sciences; the latter founded in 1779.

In Great Britain, the *Royal Society of London*, was organized in 1645, and chartered in 1662; Sir Isaac Newton being its first president. Its collections are extensive; and it has published 130 quarto volumes of transactions. The *Royal Society of Edinburgh* originated as early as 1718; though it was not incorporated till 1783: and the *Royal Irish Academy* was established at Dublin, about the year 1782, chiefly by members of the University. The Literary and Philosophical Society of Manchester, was founded in 1781; and the London Society for the Diffusion of Useful Knowledge, originated in 1827: Lord Brougham being one of its chief supporters. This latter society has acquired great celebrity by its publications, entitled the Library of Useful, and the Library of Entertaining Knowledge. The *British Association*, for the Advancement of Science, held its first annual meeting in 1831; and has done much for the promotion of physical science, by its researches and reports.

In the United States, the *American Philosophical Society*, was organized at Philadelphia, in 1769, by the union of two similar societies, previously existing; Dr. Franklin being its first president. It has directed various important investigations, and has published ten quarto volumes of valuable scientific memoirs. The *American Academy of Arts and Sciences*, was founded at Boston, in 1780; and has published four volumes of its transactions. The *Connecticut Academy of Arts and Sciences*, was founded at New Haven, in 1799; and the *Literary and Philosophical Society* of New York, originated in 1815. The *National Institution*, organized at Washington, in 1840, is similar to these societies in its constitution and objects; and derives, from its location, some important advantages for the accumulation of knowledge. Besides these institutions, we can here only name the Historical Societies of Massachusetts, New York, Pennsylvania, and several other states: the Academy of Natural Sciences in Philadelphia; the Lyceum of Natural History in New York; the Society of Natural History in Boston; the Albany Institute; the New York Naval Lyceum; and other similar institutions; the New York Society for the Promotion of the Useful Arts; the Franklin Institute in Philadelphia; the Academies of the Fine Arts in Philadelphia and New York; and the numerous Medical, Agricultural, Educational, and other societies, scattered over the Union.

Libraries

Among the most important sources of knowledge, are collections of books and manuscripts, called *Libraries*. The name is derived from the Latin, *liber*, a book; the same word signifying also the inner bark of trees, which was used for writing upon, before the invention of paper. Without the aids of writing and printing, all history would have been merged in mere tradition; and all knowledge would have been limited in its diffusion, garbled by frequent transmission, and confused by the imperfections of memory; so that a great portion of it would have been lost, or swallowed up in vague conjecture. Hence, manuscripts were the chief vehicles of knowledge, till the invention of printing; since which time, books have become the great storehouses of information; collected by the labours of men of all classes, in all civilized nations, and in each succeeding age.

The term *Literature*, is used in France and Germany, to signify learning, or rather written learning, of every kind: the Literature of a nation being understood to include all the writings which it has ever produced. As the name is derived from the Latin, *litera*, a letter, this definition seems appropriate; though the terms, literature, and literary, are often restricted in our own country, to those branches of knowledge which treat of man in his social, moral, and intellectual relations. In this sense, all human knowledge is frequently comprehended under the three heads of Literature, Science, and the Arts.

The term *Bibliography*, from the Greek, βιβλιον, a book, and γραφω, I describe, was originally applied to a knowledge of ancient manuscripts; but is now used to signify the describing of books in general. When it refers to a knowledge of their contents, it has been termed *intellectual* bibliography; when it refers to their external form, different editions, kind of paper, printing or binding, it is called *material* bibliography; and it may be termed *antiquarian* bibliography, when it refers to their comparative rarity or curiosity, and reputed or real value. So numerous are the books now in existence, on almost every subject, that treatises on Bibliography, furnishing lists of them, and critical notices of their relative merits, are of real value to the student, and even to the popular reader. A reference to some of the best treatises of this kind, will be found in the appendix to the present work.

To give some idea of the multiplicity of books, is one object of the following brief notice of celebrated *Libraries*. Pisistratus first founded a Library among the Greeks, at Athens, about 550 B. C.; and the first large Library in Rome, was that of Paulus Æmilius, taken from Perses, king of Macedon, 167 B. C. But the most celebrated Library of ancient times, was that of Alexandria, in Egypt, founded 283 B. C. by Ptolemy Philadelphus; who obtained for it the books which had belonged to Aristotle. It had increased so much as to number 500,000 volumes, when it was mostly burnt, 47 B. C., during the siege of Alexandria by Julius Cæsar. It was partly replaced by the Library of Pergamos, which was afterwards transported thither; but this, with additional collections, was burnt by the Saracens under Caliph Omar, A. D. 640. The Saracens themselves afterwards collected large Libraries, particularly at Tripolis, in Syria, and at Cordova, in Spain; which latter contained at one time 250,000 volumes.

Of modern Libraries, that of the *Vatican*, or Papal palace, in Rome, is said to contain 400,000 printed volumes, and 50,000 manuscripts. There are also large Libraries in Naples, Florence, and Milan. The

Royal Library of Madrid, contains about 200,000 printed volumes, kept in the Escurial palace. The Royal Library of *Munich*, in Bavaria, the largest in Germany, contains 540,000 printed volumes, and 16,000 manuscripts. The Imperial Library of Vienna, and the Royal Libraries of Berlin, and Dresden, contain each nearly 300,000 volumes. The Universities of Göttingen, Breslau, and Munich, have also large Libraries. The Imperial Library of *St. Petersburg* contains 430,000 printed volumes, and 15,000 manuscripts; and the Royal Library of *Copenhagen* contains a like number of manuscripts, and 410,000 printed volumes.

The *Bodleian Library*, at Oxford, the largest in Great Britain, named from Sir Thomas Bodley, who enlarged it about A. D. 1600, is said to contain 420,000 printed volumes, and 30,000 manuscripts. The British Museum, in London, contains nearly 300,000 volumes, besides 22,000 manuscripts: and there are also large Libraries at Cambridge, Edinburgh, and Dublin. The Royal Library in Paris, (*La Bibliothèque du Roi*,) is stated to contain 700,000 printed volumes, 100,000 manuscripts, and as many medals; besides one million of historical documents, and two millions of maps and engravings. Its annual increase is not less than 10,000 volumes. The Public Libraries of Europe are said to be upwards of seven hundred in number, and to contain in all about 20,000,000 volumes.

The largest Libraries in the United States, are those of Harvard University, containing about 45,000 volumes; the Boston Athenæum, 32,000; the New York City Library, 35,000; the Philadelphia Library, including the Loganian, 52,000; the National Library, or Library of Congress, 25,000; and the Charleston Library, S. C., about 15,000 volumes. The total number of books in all the Public Libraries of the United States, has been estimated at 400,000 volumes. The imperfection of our largest libraries may be readily seen by a comparison with those of Europe: but it can be fully appreciated only by those who have had occasion to make extensive research, and found their researches vain, for want of the requisite authorities.

D'Israeli, in his Curiosities of Literature, estimates the whole number of different books printed in the world prior to 1816, at 3,640,000; but Mr. Preston, in a recent report to Congress, estimates the number at only 600,000. From these and other data, we would estimate the total number of different books printed, down to this date, at 1,000,000 volumes in the German language, 800,000 in the French, 600,000 in the English, including 25,000 American, and 600,000 in all other languages; making a total of 3,000,000 different volumes, or say TWO MILLION DIFFERENT WORKS. Allowing only 1200 copies of each work to have been printed, and supposing all the volumes to be of an average size, they would form a solid pile, larger than the largest Egyptian Pyramid, although it is 500 feet high, and 690 feet square at the base, covering 11 acres of ground. The annual number of new publications in Germany, is said to be 7,000; in France it is probably 5,000; in Great Britain 3,000; and in the United States about 500 works, or 700 volumes, of which about three-fifths are original American productions.

Of the books in our own language, after deducting those which are obsolete or worthless, there still remain probably 50,000 volumes, which would repay a perusal. Supposing then a person to read 100 pages a day, or 100 volumes a year,—which is more than could well be retained and digested,—it would require 500 years to read all the books worth reading, in the English language alone! This result shows the importance of selection in our reading; or we may misdirect our powers, and misemploy our time, by dwelling on inferior works, and neglecting the nobler and more useful.

Encyclopædias.

From the great multiplicity of books on all subjects of knowledge, arises the utility of *Encyclopædias;* which, as sources of general information, deserve here a distinct notice. Their name is derived from the Greek παιδεια, learning, from παις, a youth; and ἐγκυκλιος, circular, from κυκλος, a circle; hence it may be defined, the *circle of learning* Their object is to give a summary of human knowledge; extracted and digested, for the most part, from various works; and accompanied by references to the best authors, on every subject. They are valuable works for occasional use; but most of them are too imperfect to be relied upon; either as giving all the information sought; or the latest information, on subjects which are liable to change or susceptible of improvement.

The earliest summary of human knowledge, appears to have been the books of Hermes, preserved with great care by the Egyptians, and which may be called the *Hermiana.* Hermes or Mercurius Trismegistus, is the classic name of the Egyptian Thaut, (Thot, Thoth, Thoyt, Theut, or Taaut,) supposed to have been the son of Misraim, and grandson of Ham. He is said to have invented grammar, arithmetic, geometry, astronomy, medicine, and music; and to have engraved his knowledge on pillars of stone. But as the same Egyptian word signifies also a pillar or monument, as well as its guardian deity, the name has doubtless been applied generally to the learning of the Egyptian priests, preserved in monumental inscriptions. Of the forty-two books ascribed to Hermes, some are preserved, including some which are spurious: while others are lost. They treat of the studies above mentioned, together with religion, government, and natural history, as then known.

Similar to these are the twenty-one books of the Persian *Zendavesta,* or living word, written by Zoroaster, otherwise called Zerdusht. The Persians comprehended all knowledge under the term *Magia;* and the term *magus* was synonymous with philosopher or wise man. The Chinese also are said to have an ancient work called *Tay Tsing*, or *San-tsae-too-koey*, which treats very fully and systematically of all subjects with which they were acquainted. The only general works left us by the Greeks and Romans, worthy of mention here, are those of *Aristotle* and *Pliny.* Aristotle wrote on almost all subjects known to the Greeks, but in various detached treatises: while the Natural History of Pliny, though not an exact work of science, is a valuable compendium of ancient learning.

Some works of a general nature were published in the middle ages: particularly the *Speculum* of Vincent, which we shall again have occasion to mention: but the term *Encyclopædia*, appears to have been first introduced by Professor Martinius of Bremen, in his *Idea methodicæ et brevis Encyclopædiæ*, published in 1606. Another similar work was published by Alstead, in 1620. Three large Encyclopædias have been commenced in Germany; one by Krunitz, which has been extended to 146 volumes; another by Köster, succeeded by J. F. Roos; and a third by Ersch, succeeded by Gruber: but we are not aware that either of these works has been completed.

In France, the celebrated Encyclopédie, or *Dictionnaire Raisonné*, sometimes called the *Dictionnaire Encyclopédique*, of Diderot, D'Alembert, Voltaire, Condorcet, and other associates, was published in Paris, from 1751 to 1772, in 29 volumes folio; to which 6 volumes were afterwards appended. It promulgated speculative views in philosophy, and liberal opinions in politics; the influence of which had no small share in producing the French Revolution. The *Encyclopédie Méthodique*, commenced in Paris in 1782, is the largest work ever yet published; having already been extended to 221 quarto volumes, more than 50 of which are of copperplate engravings. It is a collection of dictionaries, each one treating of a distinct branch or department of knowledge; and these dictionaries are arranged simply in alphabetical order.

The first work of this kind, in our own language, if we except the writings of Lord Bacon, which treat of nearly all the subjects of human knowledge, was the *Cyclopædia*, or universal dictionary of the Arts and Sciences, by Dr. Ephraim Chambers; first published in 1728, in 2 volumes folio; and enlarged in successive editions. Being originally a globe-maker's apprentice, Dr. Chambers wrote some parts of this work, in leisure hours, behind his master's counter. The *Encyclopædia Britannica*, was first published in Edinburgh, in 1788, in 10 vols. folio, by a Society of Gentlemen in Scotland; James Tytler being the original editor. The seventh edition is now publishing, edited by Prof. Napier. Dr. Rees' *Cyclopædia*, an enlargement of that by Chambers, was published in London, from 1802 to 1820, and republished in Philadelphia, in 47 volumes quarto, including 6 volumes of plates. It contains much information, especially concerning the Arts; but the subjects are too much subdivided, on account of the alphabetical distribution. Dr. Brewster's *Edinburgh Encyclopædia*, was commenced in 1810, and republished in New York and Philadelphia, in 18 vols. quarto; the last volume appearing in 1832. It is a highly valuable work; but the latter volumes are less complete than those of the former part of it. The *Encyclopædia Metropolitana*, the original editor of which was the late Rev. Edward Smedley, was commenced in London, in 1815; to comprise 25 volumes quarto, still publishing. It is arranged, for the most part, according to the connection of the subjects: and this alone would in our view give it a preference; aside from its being the latest, on so large a scale.

We have barely room to mention the *Encyclopædia Londinensis*, by Wilkes, begun in 1796; the *Encyclopædia Edinensis*, by Millar, begun in 1816; Nicholson's *British Encyclopædia*, commenced in 1809; and Partington's *British Cyclopædia*, printed in 1835-6. The *Penny Cyclopædia*, conducted by the Society for the Diffusion of Useful Knowledge, was commenced in 1833, and is to be completed in 24 volumes octavo. It is a work of great value. Dr. Lardner's *Cabinet Cyclopædia*, begun in 1829, in duodecimo, is a valuable series of distinct treatises on the different branches of knowledge; but we have not perceived in it any higher arrangement. An Encyclopædia was printed by Mr. Dobson of Philadelphia, in 21 volumes quarto, 1798—1803. The *Encyclopædia Americana*, edited by Dr. Lieber, commenced in 1830, and now complete in 13 volumes octavo, is chiefly a translation of the German Conversations Lexicon, alphabetically arranged; and is the most convenient work of reference with which we are acquainted. It has been reprinted in Glasgow.

CHAPTER III.

CLASSIFICATION OF HUMAN KNOWLEDGE.

The importance of classifying human knowledge, according to some regular system, has been often, if not generally, admitted; and the subject has attracted the attention of many distinguished men, in various ages and countries. As such a classification was the primary object of the present work; the writer is desirous of doing full justice to the labors of his predecessors, in this field of study; before submitting what he believes to be an improved system; with its practical application to the knowledge which is to be classified. A brief review of the different classifications, which have been hitherto attempted, will first be given; for which we are chiefly indebted to a work of much erudition, published in Philadelphia in 1816, by the late judge Woodward, under the title of Encatholepistemia, or a System of Universal Science. This review will be followed by an explanation of the new classification, here proposed; with a summary of the reasons on which it is founded.

Former Classifications of Knowledge.

To the Greeks we must refer, for the earliest classification of human knowledge, of which we possess any information. All their learning was originally comprehended in the term *Mathematics;* from μανθανω, I learn; a term which has since been very much restricted. The introduction of the term *Philosopher*, by Pythagoras, we have already mentioned. (p. 20.) Pythagoras subdivided the ancient mathematics, with reference to number and magnitude, rest and motion, into the branches of Arithmetic, Music, Geometry, and Astronomy. Music, he regarded as produced by the motion of numbers; and Astronomy, as produced by the motion of magnitudes. These four branches were afterwards called the *Quadrivium*, from Latin words, signifying the meeting of four roads. To these branches Plato added Physics, or Natural Philosophy;—and Theology; under which he probably included both Ethics and Politics. Aristotle added three other specific branches, Grammar, Rhetoric, and Logic; which have since been called the *Trivium*, or meeting of three roads; and which, with the Quadrivium of Pythagoras, constituted the seven liberal arts. A course of instruction in these seven arts, was called by the Greeks *εγκυκλιος παιδεια*, or the circle of learning; and hence, as before mentioned, the derivation of the modern word Encyclopædia. The poetical distribution of the sciences among the Muses, will not bear philosophical criticism; but probably belongs to an earlier age.

The Romans borrowed the Seven Liberal Arts of the Greeks; as enumerated in the Latin verse,—"Lingua, Tropus, Ratio; Numerus, Tonus, Angula, Astra." But Rome, first warlike, and afterwards luxurious, did little to enlarge the boundaries of knowledge; except incidentally, in enlarging the boundaries of her empire and language. Porphyry is said to have been the first who arranged the branches of knowledge in the form of a tree; and the Gnostics, or Platonizing Christians, went so far as to divide all being into material, animal, and spiritual. These are the only Roman classifications of which we can here speak. In the middle or dark ages, little was done for the advancement of science; and still less for its better arrangement. Vincent de Beauvais, (Vincentius Bellovacensis), about the year 1250, summed up the knowledge of those times, in his *Speculum Historiale*, *Naturale*, *Doctrinale*, or historical and philosophical mirror; to which was afterwards anonymously added a *Speculum Morale*, or view of morals; the preservation of all which, has thrown some light on that obscure period.

The celebrated Francis Bacon, Lord Verulam, usually called *Lord Bacon*, about the year 1605, made a classification of knowledge, according to the powers of the mind employed in acquiring it; which he considered to be memory, imagination, and reason. To memory he assigned history, which he subdivided into natural and civil; to imagination he ascribed poetry; and to reason he allotted the whole range of philosophy, or the study of the Deity, the human race, and the laws of the material world. He subdivided philosophy into physics and metaphysics; in the latter of which he comprehended mathematics and other heterogenous sciences. Lord Bacon believed in magic and astrology, and denied the earth's diurnal motion; yet, as the author of the *Novum Organum*, a work in which he pointed out the right method of discovering and applying truth, he is regarded as the great pioneer of modern science.

The French philosopher *Descartes*, considered all knowledge as either accessory or ultimate; and hence divided it into mathematics, physics, and metaphysics; the latter including theology. The *Sieur de Lesclache* published a classification of knowledge in a series of engravings: and *Comenius* published another, comprised in one hundred chapters of ten sentences each; the whole containing almost every word in common use. *Mr. Hobbes* divided all science into knowledge of facts, depending on sensation and memory, and knowledge of consequences, based upon reason. *Mr. Locke* has also left us a classification of knowledge in three divisions; *physica*, or the laws of the material world; *practica*, or rules of human action; and *semiotica*, or the means of expressing ideas. *Mr. Chambers*, the first English Cyclopædist, also prepared a classification of knowledge, in forty-seven distinct branches; arranged as either natural or artificial, internal or external: but in his Cyclopædia, he finally adopted the alphabetical arrangement.

D'Alembert, in his preliminary dissertation on the origin, progress, and affiliation of the sciences, introductory to the great *Dictionnaire Encyclopédique*, merely revived Lord Bacon's system, with some amendments; but instead of carrying his system into practice, he even doubted whether any satisfactory system could be made; and accordingly the Encyclopædia was arranged in alphabetical order. Baron Bielfield of Prussia, in his *Elements of Universal Erudition*, also adopted Lord Bacon's system; but with considerable modification in the details. More abstruse classifications have been made by Wronski of Russia in his Programme of *Transcendental Philosophy:* and by the Abbe Mango, of Palermo, in his *Acrosofia*, or Genealogy of the Sciences.

Returning to England, Sir William Jones made a division of human knowledge into history, arts, and sciences. Dr. Turner of Oxford, divided the same into religion, arts, and sciences. Mr. Horne, in his *Introduction to Bibliography*, distributes knowledge under the four heads of bibliography, history, philosophy, and literature. In Scotland, Mr. Hume incidentally comprehended all knowledge in the six departments of religion, politics, metaphysics, morals, mathematics, and natural philosophy. Dr. Robertson, the friend of Hume, and like him a historian, comprehended the same in four departments; religion, logic, ethics, and physics. Dr. Beattie, in his *Elements of Moral Science*, divides knowledge into history, philosophy, mathematics, and poetry; and Dr. Reid has adopted the more natural division, founded on the distinction between body and mind, or material and intellectual objects of thought; but beyond this step, his classification is deemed comparatively imperfect.

In our own country, Dr. Samuel Johnson, the first president of King's, now Columbia College, in New York, prepared a work entitled *Noëtica*, or a general scheme for the partition of the sciences; in which he divided all knowledge into belles-lettres and philosophy: the former including grammar, rhetoric, eloquence, history, poetry, and criticism; and the latter comprehending mathematics, mechanics, physics, and astronomy, together with metaphysics and ethics, embracing psychology, theology, economics, and politics. In this arrangement, the distinction between sciences and arts was entirely neglected; the theoretical and practical parts of knowledge being presented, throughout, in combination. This work was published by Dr. Franklin in Philadelphia; and reprinted in London,—but without the title.

The late President Jefferson devoted much attention to this subject; both in classifying the books of his own Library; and in arranging the professorships of the University of Virginia. Mr. Jefferson adopted Lord Bacon's principle of classifying knowledge, according to the mental powers employed; and he assigned to *memory*, civil and natural history; to *reason*, moral and natural philosophy; and to *imagination*, the fine arts. These heads, he subdivided into forty-four chapters; most of which are distinct sciences, or branches of knowledge: and this classification, it is believed, still remains in the National Library at Washington; part of which was purchased of Mr. Jefferson by Congress. The late Mr. Jay, of New York, divided all knowledge into sciences, and arts; the *sciences* relating to things, to events, or to duties; and the *arts* relating either to utility or to pleasure.

Judge Woodward, to whose enthusiasm we are so much indebted, for this history of the classifications of knowledge, himself prepared two classifications; one founded on the distinctions of mind alone, matter alone, and mind and matter connected; the other founded on the distinction of auxiliary and ultimate branches. The subdivisions are the same in both; first into six classes; next into eighteen orders; and lastly into sixty-three or sixty-four distinct sciences: to all of which, names derived from the Greek language are applied; many of them so new, and burthensome to the memory, as to prevent their ever coming into general use. We might criticise this classification, had we the heart to find fault with a writer who has done us so essential a service, and who labored with such devoted zeal for the cause which we have espoused.

The distinguished philosopher Ampère, in his essay on the *Philosophy of the Sciences*, has given a "natural classification of all human knowledge," devised in 1830, and published in 1834. As this classification bears a closer resemblance, than any of the preceding, to that here proposed, it becomes proper to state, that the classification of knowledge adopted in this work, was actually completed, before the writer had seen Ampère's work, or learned its contents. Ampère adopts a binary or dichotomous division of knowledge, into two kingdoms, *Cosmology*, and *Noology;* which are subdivided into four sub-kingdoms, and eight embranchments. These are the sciences, Mathematical, Physical; Natural, Medical; Philosophical, Dialegmatical; Ethnological, and Political; which are farther subdivided into sixteen sub-embranchments, and these into thirty-two sciences of the first order.

The names of these sciences, as arranged by Ampère, are, 1. Arithmology; 2. Geometry; 3. Mechanics; 4. Uranology; 5. General Physics; 6. Technology; 7. Geology; 8. Oryctotechny; 9. Botany; 10. Agriculture; 11. Zoology; 12. Zootechny; 13. Medical Physics; 14. Hygiene; 15. Nosology; 16. Practical Medicine; 17. Psychology; 18. Metaphysics; 19. Ethics; 20. Thelesiology; 21. Glossology; 22. Literature; 23. Technesthetics; 24. Pedagogics; 25. Ethnology; 26. Archeology; 27. History; 28. Hierology; 29. Nomology; 30. Military Arts; 31. Social Economy; and 32. Politics. These sciences of the first order, are farther subdivided into 64 sciences of the second, and 128 sciences of the third order; the names of which are for the most part new or unusual. Ampère considers that each division of knowledge may be regarded under four different points of view; 1. Absolutely, or irrespectively of others, and externally, or regarding only its prominent features; 2. Absolutely, and intrinsically, or examining its nature and elements, considered by themselves; 3. Relatively, or comparatively, and having regard only to its external relations; and, 4. Relatively and intrinsically, having regard to its nature and elements, compared with others. On this basis, Ampère founds his classification of the sciences; which we regard as decidedly superior to any of those which preceded it; though we think it too complex to meet with general favor, as a popular system of knowledge.

The Proposed Classification of Knowledge.

The writer's attention was long since attracted to the subject of a classification of all human knowledge; in connection with the project of an American Association for the promotion of Literature, Science, and the Arts. His first essay on the subject, embracing the principles of the present classification, was submitted to the Dialectic Society of the United States Military Academy, at West Point, in the spring of the year 1829; and was printed, with additions and amendments, in April, 1836, in the Boston Scientific Tracts, for the Diffusion of Useful Knowledge. The plan has since been materially improved; partly by the aid of learned and judicious friends: and the result of much careful study has been the following System of Pantology; which is now submitted to the reader's candid examination.

In this system, all human knowledge is primarily divided into four great provinces: 1. *Psychonomy*, including the Laws of Mind, or intellectual sciences; 2. *Ethnology*, or the Study of Nations, geographically and historically; 3. *Physiconomy*, or the Laws of the Material World; and 4. *Technology*, or the Study of the Arts which relate to material objects. These four *provinces* are next subdivided, each into four *departments:* and each department embraces a group of several *branches* of knowledge, closely related to each other. Of the sixteen departments, several were already more or less distinctly formed, and generally recognised: and one of them, the department of Mathematics, served as a model, already finished, by which to fashion the others. In these departments, several branches, which like the unformed stars in Astronomy, had not yet been systematically arranged, may, it is believed, find their proper place; thus completing the analysis of general knowledge. To the four provinces, and several of the departments,—and to some few of the branches, the liberty has been taken of applying new names, derived from the Greek language; which will at once be understood by the classic scholar; and which, avoiding circumlocution, will admit of a more exact application to these divisions of knowledge, than terms which have already been used in various significations.

In arranging the departments and branches among themselves, four leading principles, have, it is believed, been constantly kept in view, as guides to a natural method. They are the Order of dependence; the Order of time; the Order of place; and the Order of resemblance. The difficulty of adjusting these principles, where they conflict with each other; and of deciding, in such cases, which of them ought to prevail, can only be appreciated by those who have attempted similar applications:—but this difficulty would arise equally in any other classification; founded, as it is, upon real anomalies, or irregularities, in the very subjects of knowledge. The different branches of knowledge are so concatenated, or interwoven; having, as Cicero expresses it, a common bond or tie, (*vinculum commune*); that no classification can perfectly satisfy all the conditions; though one may approach much nearer to it than another. That classification which satisfies the greatest number of the most important conditions, is the best, therefore, which the subject admits; and our only resource is to treat of each topic most fully in the place where it most strictly belongs; with careful references to and from those connections or relations, which the system does not bring explicitly into view. This principle of *double reference*, will be found occasionally necessary in every possible system of human knowledge; and especially so in alphabetical Encyclopædias; which, without it, would be labyrinths without a clue.

If we adopt Ampère's first division of human knowledge, into two great kingdoms.—*Noology* relating to mind, and *Cosmology* relating to matter,—the first two of our provinces would correspond to the former, and the other two, to the latter. Strictly speaking, however, the second and fourth provinces relate to mind and matter in connection; that is, to man, and his labors, considered as an immortal spirit, transiently inhabiting a mortal body, and thus bound to the material world. Indeed, so closely are mind and matter connected, in all human researches, that we regard this step in the division, as of minor importance; and have accordingly omitted to give it a distinct place. Should it be objected that the names of our provinces, and minor divisions, are not absolutely precise, but admit of greater or less extension; we must reply that the same remark holds true of nearly all the general terms of science; which are in a like degree arbitrary and exceptionable, owing to the inherent defects of human language. But we add, that the names here chosen may be easily adapted, and without confusion, or violation of existing usage, to the ground which they are intended to cover.

With these preliminary remarks, we proceed to resolve the four great provinces of human knowledge into their appropriate departments; briefly explaining, as we proceed, the reasons for the arrangement here adopted.* The acquisition of some one language, is necessarily the first of mental attainments: and this is deemed a sufficient reason, in the absence of opposing ones, for placing first in order, the department of *Glossology;* or the study of all Languages; including Grammar and Lexicology. As the study of Grammar leads to that of Rhetoric; which is introductory to Logic; and this to Phrenics or Mental Philosophy, and Ethics or Moral Philosophy; and these to Education; it seems proper to place next in order the department of *Psychology*, in which all these branches are, we think, properly included. The Mental Sciences form a natural introduction to the subjects of Law and Government, including Political Philoso-

* The derivation of the names of all the provinces, departments, and branches, will be found at the commencement of the several parts and chapters, in the subsequent divisions of this work.

phy and Political Economy; which we would therefore comprehend in the next department, *Nomology:* and from human laws, we pass, by an easy climax, to the divine laws, and the study of all Religions; constituting the department of *Theology;* which, from its incomparable importance, deserves the last and highest place in the department of Psychonomy.

The study of mankind at large,—nations, and individuals,—is placed after the studies of Law and Religion; in order that it may not interrupt the series of intellectual sciences, to which it is indeed auxiliary; and also, that the principles derived from them, may be employed for its elucidation. The province of Ethnology, naturally commences with the department of *Geography*, including Statistics, Voyages, and Travels, which relate chiefly to mankind in society; but reserving the principles of Physical Geography, as far as may be convenient, for the next province, or the material world. The department of *Chronography*, or History and Antiquities, comes next in order; depending immediately on Geography; and completing the special study of nations. The department of *Biography*, or the study of men individually, might be merged in that of Chronography, to which it is subservient,—were it not so extensive, and important, as to merit a distinct place. There remains the study of Poetry and Romance; closely allied to the preceding; and which we therefore comprehend in the next department, that of *Callography;* concluding the province of Ethnology.

Proceeding next to the material world, or the province of Physiconomy, we place in this province, and first in order, the department of *Mathematics*, as a necessary introduction to the physical sciences and arts; among which it finds its highest applications. Closely connected with this, follows the department of *Acrophysics*, including Natural Philosophy, with Astronomy and Chemistry; and thus comprehending all the dynamical laws of matter. From Natural Philosophy, we pass, by an easy transition, to the department of *Idiophysics*, or Natural History; which examines and describes the individual objects of nature; of which Acrophysics traced the elements, and general laws. The study of Natural History, prepares the way for that of the Medical Sciences, or the department of *Androphysics;* which completes the province of Physiconomy.

In the last province, that of Technology, or the physical arts, depending on the physical sciences, we commence with the study of the materials and machinery which these arts employ; as a necessary introduction to the department of *Architechnics*, or the Arts of Building and Conveyance. Next to this, we place the remaining arts of most general utility,—Agriculture, Manufactures, and Commerce;—closely associated in public estimation; and together forming the department of *Chreotechnics.* The Arts of War, which involve various mechanical operations, and serve especially for the defence of commerce, come next in order; constituting the department of *Machetechnics;* comprising both military and naval tactics. There remain only the Fine Arts, including painting and music; which we think should conclude the study of the arts, as Callography concluded that of nations; the amusing or ornamental portions taking the final place. Thus; the department of *Callotechnics*, completes the province of Technology; and with it our tree of human knowledge, as represented in the frontispiece of the present volume.*

We will not stop here to explain the subdivisions of these sixteen departments into branches; or of the branches into sections; but reserve these explanations, for their places, in the body of the work. The divisions already made, we consider as the basis of the whole system: and by remembering the names and order of the sixteen departments, we have a key to the whole distribution of knowledge; as the alphabetic order is a key to the finding of all the words in a dictionary. It is true that many of our division lines, between the provinces, departments, and branches, are not precisely commensurate with the terms used to designate them; but the principal explanation of these seeming anomalies, is, that we have endeavored to follow existing arrangements and divisions, as far as they could be made to harmonize with a general system; and thus to make that system more acceptable than if the old lines of demarcation were greatly altered.

We have differed from Ampère, in introducing the study of the human mind, before proceeding to that of the material world. We can see no advantage in placing the study of mathematics before that of languages; or of natural philosophy, before mental and moral; or of medicine, before theology; neither do we think it the common order, in the best systems of education. We believe that the best course is that which prosecutes the four great provinces of knowledge simultaneously; commencing with languages, geography, mathematics, and the useful arts: and so proceeding to the higher studies of each province:—but still the studies of language, and geography, should be in advance of the others. As, however, the provinces cannot well be arranged collaterally, in a single volume; and as some one of them must be named first; we have no hesitation in commencing with that which possesses the highest dignity; and arranging the remaining three according to their relations to this, and to each other.

It would be presumptuous to suppose, that we have in every case succeeded in arranging the divisions of knowledge according to their strongest, and most important relations. As in the natural systems of Botany, the same plant, having strong affinities to two or more different families, or genera, is differently located by skilful botanists; so in Pantology, it cannot be surprising that different opinions should prevail, concerning the arrangement of the branches of knowledge,

* Ampère distributes the branches which we have comprehended in the province of Technology, among the sciences on which they most depend. Thus, he limits Agriculture to the cultivation of plants, and connects it with Botany: but the rearing of animals, he makes a distinct branch, connected with Zoology. Our objection to this arrangement, is, that it breaks the chain of the Physical Sciences, which have close and important relations; and also separates those arts, which are usually and naturally associated, and which often depend on two or more sciences in connection.

even among those who have studied the subject most carefully. But these discrepancies have not prevented the introduction, nor destroyed the utility, of a natural system in the former case; nor can we see any greater reason why they should produce these effects in the latter. In either case, the study of these relations cannot fail to suggest new ideas, and to prove a useful exercise for the mind.

It may perhaps be objected, that some terms, applied to large divisions of knowledge, and now in general use, have been omitted in the nomenclature here proposed. The answer is, that these terms are so vaguely or variously applied, as to be unsuitable for a more exact division. Of the term *Philosophy*, we have already spoken, (p. 19, 20); and will only add that there is no one province, nor department of knowledge, for which it would, in our view, be a definite, and precise appellation. We would rather apply it, in its original sense, to knowledge, or the principles of knowledge in general. Knowledge is often spoken of under the three divisions of Literature, Science, and the arts. But *Literature*, as already mentioned, (p. 24), more properly signifies written and printed knowledge of every kind: or if applied in a more limited sense, to designate those studies which relate to man in his social and moral relations, the term is still indefinite. Equally indistinct is the division between Sciences, and Arts. *Science* is the theory, and *Art* is the application of that theory to some practical purpose. Science explains principles, and Art describes processes; but these are often so essentially connected, that to separate them would be an unnatural divorce. Thus, the Physical Sciences employ processes which might almost rank them as arts; and the Physical Arts have their own peculiar principles, which might almost entitle them to be ranked as sciences. Grammar is both a science, and an art; and the same may be said of Rhetoric, Logic, and other branches; but still they are single and distinct branches of knowledge.

There are two other terms, which should here be particularly referred to;—Metaphysics, and Belles Lettres. The name *Metaphysics*, originated in a treatise by Aristotle, which, coming after his writings on Physics, began with the words μετα τα φυσικα, that is, *after physics;* and which speculated vaguely on subjects beyond the reach of exact knowledge. Hence the term Metaphysics was coined by his pupils, or by the schoolmen, to signify "the science of the ultimate causes of all being." It has been divided into *Ontology*, relating to the nature and essence of all being or existence, with its qualities and attributes; *Cosmology*, or the nature of the material world, including the question of Leibnitz, whether God must necessarily have created it perfect, and whether it is so in fact; *Anthropology*, or the nature and essence of man; *Pneumatology*, or that of unembodied spirits; and *Theodicy*, which attempts to investigate the nature, essence, and attributes of the Deity. To Metaphysics belong such wild speculations as those of Pythagoras, already mentioned, (p. 20), and the later hypothesis of Formey, "that sensation is carried on entirely by means of *vibrations*, which are communicated through the nerves, from the first point of contact, till they reach the farthest extremities, which are *dipped in a spiritual fluid*." So much of Metaphysics, then, as consists of real knowledge, or rational conjecture. will be found distributed among the departments in our arrangement; but as a distinct division of knowledge, we can recognise it only when used, as it sometimes is, to signify Phrenics, or Mental Philosophy.

The term *Belles Lettres*, is of French origin; literally signifying fine or beautiful writings. It includes Poetry and Oratory; but how much more, it would be difficult to say; as, in the words of a standard writer, it is "so exceedingly vague and indefinite, that miscellanies, perhaps, would be equally explicit." If restricted to Poetry, Romance, and similar miscellaneous literature, it is superseded in our arrangement by the term Callography; which we think more euphonic; and which admits of an exact definition. The term *Polite Literature*, is occasionally used, synonymously, we believe, with Belles Lettres; but perhaps including Biography, History, and Voyages, and Travels, with sermons, orations, and addresses. Alike vague, and still more general, is the term *Criticism*, derived from the Greek κρινω, I judge; or more immediately from κριτικος, a judge or critic. This term is sometimes limited to the application of the rules of Rhetoric to literary composition: but it properly applies to an examination of works on all subjects whatever; and an exposition of their merits.

The question whether the best possible classification of knowledge, made at the present time, would always continue so; or whether it would admit of farther improvement, as knowledge itself advances;—is one which time alone can answer. In expressing an opinion on this subject, we would return to the comparison introduced in our preface. As in Geography, the surface of the earth has been mostly explored; and if any lands remain unknown, they are so situated, in the torrid or frigid zone, as to be almost inaccessible; so in Pantology, we believe that the great provinces and departments of knowledge have already been travelled over; and that no very wide regions have escaped the notice of the many voyagers who have set out in search of unknown realms of thought. These provinces and departments, we believe, will remain essentially distinct, as long as the material world, and the human constitution continue the same; though their boundaries may be more or less changed, like those of states and nations. But though the general features of knowledge have been mostly explored, much, doubtless, remains to be done, in the supplying of details, the correction of errors, and the combination of all the parts into one harmonious whole. We believe, then, that a classification which will satisfy the present demands of knowledge, will continue to be applicable, in its general outlines, till a new order of things shall supersede the present; or a new intellectual world shall come within the reach of human ken.

Our plan is now before the reader: and the remainder of this work will be devoted to its practical illustration. On the advantages of such a classification of knowledge, we will not here expatiate. Its convenience and utility, in the arrangement of Libraries, will best be shown by the exemplar Catalogue of Select Books, appended to this work. To make the plan complete, however, a place must be assigned for Encyclopædias and other general works; which, if entirely general, we would place first of all in the catalogue; but if general only in regard to one province or department of knowledge, we would then place them at the beginning of that division to which they relate. The system is equally applicable to Libraries, or to Collections of Manuscripts; as the writer has tested by his own experience. A Catalogue, thus arranged, should of course conclude with an alphabetical index of authors' names ; referring back to their different works.

By such a classification of knowledge, the mind is disciplined, and aided, in its highest efforts of analysis and comparison. A love of order, and method, is cultivated ; which cannot fail to have a beneficial influence, in various mental operations, and in the active pursuits of life. The system forms a kind of Mnemonics, or artificial memory ; by which ideas are more readily retained and recalled, than if mingled in confusion :—and if the mind is not better furnished thereby; at least its furniture is better arranged, and more ready for use. The young reader especially, will, it is hoped, derive benefit from such a system of Pantology. To know how much there is to be known, is, of itself, a stimulus to the inquiring mind , and to comprehend the relations of the different branches of knowledge, is no small step toward their thorough acquisition. Finally, it must contribute to gratify that curiosity, which was implanted in our breasts ; not only to fit us for secular pursuits, but to raise our thoughts above them ; to bring us into closer communion with the Great Author of Nature, through his works, and his revelations ; and to prepare us, in some degree, for a higher and eternal state of existence, in His immediate presence.

FIRST PROVINCE;

PSYCHONOMY.

In the province of Psychonomy, we include those studies which relate more particularly to the human intellect, and the laws by which it is governed. The name is derived from the Greek, ψυχη, the soul; and νομος, law; literally signifying the Laws of the Mind, in contradistinction from those of Matter. In this province we comprehend the departments of *Glossology*, or Languages; *Pyschology*, or Mental Sciences; *Nomology*, or the Studies of Law and Government; and *Theology*, or the Study of all Religions. The reasons for arranging these departments in this order, and comprehending them together in the first province of human knowledge, have already been briefly explained. [p. 33. 35].

I. DEPARTMENT:

GLOSSOLOGY.

In the department of Glossology, we include the study of all Languages; or the means of communicating ideas, by *words;* whether written or spoken. The name is derived from the Greek, γλωσσα, the tongue; this being the principal organ of speech. The name *Linguistics*, from the Latin, *lingua*, the tongue, has also been applied to this department, by the Germans; but we prefer the term above adopted; sanctioned, as it is, by the authority of Ampère. It has the advantage of being symmetrical with the names of the succeeding departments; and of similar origin; while it is at least equally euphonic with the German name. The term *Philology*, was formerly applied to Literature in general; and has sometimes been restricted to the study of languages, or their philosophical principles and relations; but it is now more generally applied to critical examinations of Classic Writings; particularly in regard to their exact meaning, and verbal peculiarities. The present department is placed first in order; because an acquaintance with some one language, is the first step in the acquisition of knowledge, beyond the ideas acquired by mere sensation. Some writers have even doubted whether we could think at all, without words to embody our ideas; but this is probably carrying the point too far; especially in regard to infants, before they acquire some knowledge of words.

A *Language*, so called from the French, *langue*, also signifying the tongue, is a system or collection of sounds, or signs of sounds, called *words;* which express ideas, or thoughts; and by means of which, ideas are communicated, from one intelligent being to another. In a wider sense, all modes of conveying ideas, from mind to mind, are comprehended under the general term Language. Among these modes, we would mention *gestural* language, in which ideas are conveyed by gestures, or by looks; as in the ancient pantomime, or the modern language of the deaf and dumb; and *exclamative* language, expressed by vocal sounds, though not by words; as cries of pleasure, or pain. These modes of expression have also been termed *natural* language. To them might be added *pictorial* language; in which ideas are conveyed by pictures; as among the ancient Mexicans;—and *musical* language, if such it can be called; which, unless used arbitrarily, as in the bugle or trumpet war calls, may serve to excite the feelings, but hardly to convey distinct ideas. Pictorial language serves well to indicate sensible objects; but in regard to abstract or general ideas, it is also vague, and imperfect; unless used arbitrarily, and understood in the same sense by both the parties using it.

The remaining and principal class,—is that of *verbal* languages; in which ideas are expressed by words, or signs of words; unless written characters are regarded not as signs of words, but as immediate signs of ideas. Telegraphic signals, being confessedly signs of words, in some selected language, may be mentioned here, and referred to their place in the department of Callotechnics. The origin of verbal language is doubtless coeval with that of the human race. Adam, it is recorded, gave names to all animals;—but whether by immediate inspiration, or by his own suggestion, is a point not ascertained; nor is it of any practical importance. All mankind, we may infer, spoke one and the same language, in the primitive ages: and of course this would be the language of Noah and his family. Many writers suppose that the primitive language was essentially the same as the Hebrew; having been preserved unchanged among the patriarchs. The diversity of languages, now prevailing over the earth, is generally attributed to the confusion of tongues at Babel: though some learned men believe this to have been simply a confusion of counsels or purposes; and that the diversity of languages arose from the subsequent dispersion of mankind, as recorded in the Scriptures.

The invention of letters, was attributed, by some of the Greeks, to *Cadmus*, the Phœnician; who introduced them into Greece, 1519, B. C.: but Plato and Sanchoniathon ascribe this invention to *Thaut*, the Egyptian; whom we have already mentioned; (p. 26); and who is said to have carried letters from Phœnicia to Egypt, on removing thither with Mizraim, his father. Some suppose the first letters to have been those written on the tables of stone, on Mount Sinai. Others believe that letters were invented before the flood:—an opinion corroborated by the statement of Josephus, concerning the pillars of Seth; though this statement has been doubted. We incline to the latter opinion; and think that the first letters were suggested by hieroglyphics: the picture of a sensible object suggesting the shape of the letter; and the name of that object containing the sound thus represented. This was certainly the case in some of the Egyptian Hieroglyphics; which would not have been so, had simpler letters been previously known in Egypt.

Hervas, an Italian, published, in 1784, a Catalogue of the Languages then known; to which he appended 150 different vocabularies: but J. C. Adelung and J. S. Vater, in their admirable work, the *Mithridates*, (or "Allgemeine Sprachenkunde"), completed in 1817, in Germany, have given the best classification of all known languages; and the Lord's Prayer in nearly 500 of them. They estimate the total number of languages, and dialects, known in the world, at about 3000:—or 1200 in America; 1000 in Asia; 500 in Europe; and 300 in Africa. Most of these are mere dialects, or variations of other tongues: so that they may be reduced to about 80 original languages: and these may be arranged in a few groups or families; those of each family having doubtless a common origin. The Bible has been translated, wholly or in part, into about 180 languages, including those which are deemed the most important. The most valuable languages to our own country, are probably the

Latin, Greek, and Hebrew, of the ancients; and the English, French, and German, of the moderns; which, together, contain most of the treasures of human learning. Next to these, we would place the Arabic, Malay, and Chinese, in the East; and the Italian, Portuguese, and Spanish in the West; all of which are valuable, for purposes of communication and commerce.

If all nations spoke one and the same language, much of the time now spent in the study of Glossology, would be saved. Several attempts have been made to form a *Universal Language*, which should supersede all others; particularly by Bishop Wilkins, of Chester, in England, who, in 1668, published an "Essay towards a real character and philosophical language." He very fancifully observes, "if *Da* signifies God, then *ida* must signify the opposite, or an idol; if *dab* be spirit, *odab* will be body; if *dad* be heaven, *odad* will signify hell." But in the present state of things, it is manifestly impossible to introduce such a language, even were it perfect; which is not the case with any of those proposed. Our hope is, that the less important languages will gradually sink into disuse; while the leading tongues approximate more closely to each other, till this evil finds a natural remedy. Meanwhile, the resemblance of languages, serves to trace the origin and affiliation of nations; and these resemblances have been carefully studied by many learned men, for that purpose.

We shall treat farther of Glossology, under the divisions or branches of General Grammar; Oriental Languages; European Languages; and Barbarous Languages; into which branches, this department may, we think, be naturally divided.

CHAPTER I.

GENERAL GRAMMAR.

General Grammar is that branch of Glossology which explains the structure and principles of language. The name is derived from the French, *grammaire*, of the same meaning; and this from the Greek, γραμμα, a letter or epistle. It is found, by an extended comparison, that most languages agree in their essential structure, and are governed by certain laws or principles, which it is the object of General Grammar to investigate and explain. Particular Grammar, as English or French, applies these principles to some particular language, including the art of speaking and writing it with propriety. These principles are first derived from the general practice, or usage, in writing or speaking any language; and this usage, they afterwards serve to regulate. Hence, the importance of studying them will at once be perceived, as a guide to the right use of words in composition and conversation.

The origin of Grammar, as a distinct branch of knowledge, is, as we have already mentioned, ascribed to Aristotle. (p. 29). The Greeks and Romans carefully studied their own language, but neglected all others,—calling them barbarous, and regarding them as unworthy of notice. The first important work on General Grammar, was that published in 1660, by Arnauld and Launcelot, of the Port Royal School near Paris, (under the title of *Grammaire générale et raisonnée*), commonly known as the Port Royal Grammar. It was followed, in England, by Harris' *Hermes*, or a Philosophical Inquiry concerning Universal Grammar; published about 1760; and by John Horne Tooke's *Epea Pteroenta*,* or Diversions of Purley, published in 1786; in which he endeavours to show that all other parts of speech are derived by abbreviation, or contraction, from the noun and the verb. In our own country, much has been done for General Grammar, by Mr. Duponceau; particularly in the investigation of the Indian and Chinese Tongues. He arranges all languages in five classes; 1. The *asyntactic*, like the Chinese, in which the words have no inflexions; 2. The *synthetic*, as the Latin, in which several ideas are expressed by one word, as *amatur*, he is loved; 3. The *analytic*, as the English, having a separate word for almost every modification of thought; 4. The *mixed*, intermediate between the two preceding, as the Italian; and, 5. The *polysynthetic*, in which a whole phrase, or sentence, is expressed in one long, compound word, as in most of the aboriginal languages of America.

Grammar may be subdivided into Orthology, Lexicology, and Accidence, which relate to words individually; and Syntax, and Prosody, which relate to them as connected in sentences.

§ 1. *Orthology*, so named from the Greek ορθος, correct, and λογος, a word, is that part of Grammar which treats of letters and sounds, as composing words. *Articulate sounds*, are those formed by the organs of speech, or human voice, in pronouncing words; and these sounds are represented graphically by *letters;* or by other more comprehensive *characters*, as the Arabic numerals, and algebraic symbols. Since different languages have different letters, and sounds, and often express the same sound by different letters; the subject of articulate sounds in general, has been treated of as a separate study, under the name of *Phonology:* and that of graphic characters, may be treated in the same manner, under the name of *Graphology*. In regard to any one language, the study of the letters, and right mode of spelling words, is called *Orthography:* and the study of its sounds, and the right pronunciation of words, is called *Orthoepy*. These, however, are so connected and dependent on each other, that we include them both under the more general term, Orthology.

All the letters used in any one language, arranged in a certain order, constitute its *alphabet:* but the same letter sometimes represents two or more sounds; and the same sound may be represented by two or more letters, singly, or united. Letters, and articulate sounds, are generally classed as either vowels or consonants: *vowels* being simple, independent sounds, as *a*, *o:* while consonants, as *b*, *d*, cannot be fully sounded without the help of a vowel. Consonants are also subdivided, according to the organs chiefly used in pronouncing them, into *labials*, formed by the lips, as *b*, *p*, *f*, *m*, *v; lingua-dentals*, formed by the tongue and teeth, as *d*, *t*, *l*, *n; palatals*, formed by the palate, as *ga*, and *k; gutturals*, formed in the throat, as our *ha*, or *h*,

* Επεα Πτεροεντα, or winged words.

and the German *ch;* and *nasals*, formed partly by the nose, as our *ng*, and the French *m*, or *n*, at the end of words. The letters *s* and *z* are called *sibilants;* being pronounced with a hissing sound. Our letters are borrowed from the Romans: and as they expressed *u* and *v* by the same character, these letters have often been injudiciously mingled, in the older dictionaries. The same may be said of the letters, *i* and *j*. Words are divided into *syllables:* each of which is pronounced by a single impulse of the voice. In writing, or printing, the letters which belong to the same syllable, should never be separated.

Accent is a strong enunciation of one or more syllables in a word, thereby rendering the pronunciation more distinct: and *emphasis* is a similar stress on some important word or phrase in a sentence. *Cadence* is a rise or fall of the voice, at the close of a sentence; aiding to express its signification. The Orthography and Orthoepy of our language, are very irregular, and can only be learned from Spelling or Reading Books, or from Dictionaries. Where these latter disagree, we would be guided by custom, or the analogy of our own language, or the derivation of the word from other languages; exercising our own judgment in each case of disagreement among standard authors. Thus, we prefer to spell the words *honor*, *favor*, and the like, without the letter *u:* because this letter is superfluous; and they are more naturally derived from the Latin words, ending in *or*, than from the French, ending in *eur*. But we would pronounce *oblique* so as to rhyme with antique, and unique; on account of its similar orthography, and derivation.

§ 2. *Lexicology*, is that part of Grammar which treats of the signification of words; being so named from the Greek λεξικον, a dictionary; and this derived from λεγω, I speak. Hence, a writer of dictionaries is called a lexicographer; and the art of writing them, lexicography. *Etymology*, from ετυμος, true, and λογος, word, treats of the derivation of words, whether from foreign languages, or from other words in the same language: while the mere study of definitions of words, may be termed *Orismology*, from ορισμος, a definition. Both these studies, closely connected as they are, we would include under Lexicology. A complete *Dictionary* of any language, should, we think, include not only the words in common use, but also *obsolete* words, and *technical* terms; marking them as such; and giving their derivations, as well as definitions. It ought also to give a full list of proper names, both of persons and places; with their correct pronunciation, as far as it can be ascertained. Those compound words, and phrases, which, by combination, acquire a peculiar meaning, should also be carefully inserted.

As regards their structure, words are either primitive or derivative. A *primitive* word is one which cannot be reduced to any simpler word in the same language: but *derivative* words are formed from primitives, either by the addition of one or more syllables, or by the union of two or more words; as ink-stand, pen-knife. These latter, are also called *compound* words. A syllable added at the beginning of a word, is called a *prefix*, or, less properly, a preposition; but a syllable added at the end of a word, is called a *suffix*, or termination. Most languages contain many derivative words, which are formed on regular principles; the additional syllables being generally significant. Thus, from the verb, to love, comes the name *lover:* from the adjective, white, comes the noun *whiteness:* from the noun, length, comes the verb *to lengthen:* from the adjective, slow, comes the adverb *slowly:* and from the adjective, new, comes the verb *to renew.*

Many words have more than one signification; and their meaning must be inferred from the *context,* that is the other words with which they are associated. An *ambiguous* word, or phrase, is one which has two or more significations; as, for example, the phrase, "And thus the son the sire addressed." *Synonyms,* or synonymous words, are those which have the same meaning; as omnipotent and almighty. There is no better method of learning the exact signification of words, than by a careful study of the languages from which they are derived; —a fact which gives increased importance to the study of the ancient, as well as modern tongues. Recourse should also be had to the best speakers and writers; and to our standard Dictionaries; which have themselves been prepared by the means here referred to.

§ 3. *Accidence,* is that part of Grammar which treats of the functions, or uses of words; and the different parts of speech into which they are consequently divided. The name is from the Latin *accidens,* happening or belonging to; in reference to the inflexions, or changes of form, which several of the parts of speech undergo; and we prefer this term, as being more suitable and definite than the terms *Etymology* and *Analogy;* which have both been used in the same signification. In our language, as in most others, there are nine *parts of speech:* the noun, article, adjective or adnoun, pronoun, verb, adverb, preposition, conjunction, and interjection. The participle is also considered by some grammarians, as deserving to be included in this list.

A *noun* or substantive, is the name of any thing; as man, happiness. Nouns in the singular number express only one object; but in the plural they express more than one; as men, faces. In the nominative case they simply name the direct agent, or the passive recipient of an action; as the *boy* plays: the *man* is hurt: in the possessive case they indicate property or connection; as the *boy's* book: and in the objective case, they show the object of an action or relation; as they hurt the *man.* Nouns in the masculine gender denote males; in the feminine, females; and in the neuter gender, objects to which no sex is attributed. An *article* is a word used to restrict or to generalize a noun. Our language has but two articles; *a* or *an,* called the indefinite, and *the,* which is called the definite article. An *adjective,* or adnoun, is a word used to define, qualify, or modify a noun; as *good, strong, white.* Adnouns in the positive degree, express quality or quantity, absolutely or generally; in the comparative degree, they express it more strongly, by a reference to other objects; as better, stronger: and in the superlative degree, they express it pre-eminently, with reference to all the objects compared; as best, strongest. Numeral adnouns, are those which express numbers, or numerical order; as one, two, three; first, second, third. The words called adjective pronouns, we think are more properly adnouns; whether possessive, as *my, thy;* or demonstrative, as *this*, *that;* or distributive, as *each*, *every*, *either;* or indefinite, as *one*, *some*, *other*, *any*, *all*, and *such*. A *pronoun*, is a word used instead of a noun, for the sake of brevity or variety. The personal pronouns are *I*, *thou* or *you*, and *he*, *she*, or *it*, with their plurals. *I* is said to be in the first person, referring to the person who speaks; *thou* in the second person; and *he*, *she*, or *it* in the third. These pronouns are declined like nouns; being found in all the three cases, nominative, possessive, and objective; as *I*, *my* or *mine*, *me;* thou, thy or thine, thee; he, his, him; she, hers, her. The relative pronouns are *who*, *which*, *that*, and *what;* all referring to some antecedent word or phrase; except in asking questions, when they are termed *interrogative pronouns.*

A *verb*, is a word by means of which some action, or state, is attributed to some agent, or subject; as I *am*, he *loves*. An *active verb*, expresses a direct action; and when some object is at the same time acted upon, or affected thereby, the verb is called transitive; as they *love* virtue. A *neuter verb*, simply expresses some state or relation; and a *passive verb* expresses the same, with a reference to some agent, as producing or causing that state; as he *is loved*. A verb in the *infinitive mood*, expresses an action, or state, without immediate reference to any particular agent; as *to love:* in the *indicative* mood, it makes a declaration, or asks a question: in the *imperative*, it commands or requests: in the *potential*, it expresses power, obligation, or possibility; as he *can go:* and in the *subjunctive* mood, it implies some condition, or contingency; as if he *come* I will see him. A verb in the *present tense* refers to present time: in the *imperfect* tense, it refers to past time, either indefinitely, or specified by the context; as they *spoke* or *were speaking:* in the *perfect* tense, it refers to past time completed, though it may be very recent; as he *has gone:* and in the *pluperfect* tense, it refers to past time anterior to some other past time alluded to; as they *had gone* when he arrived. A verb in the *future* tense, refers to future time generally; and in the *perfuture* or second future, it refers to future time anterior to some other future time alluded to; as they *will have seen* him before he arrives. Verbs are also varied in reference to number and person; as I *am*, thou *art*, he *is*, we *are*, you *are*, they *are:* and the assemblage of all these variations, constitutes the *conjugation* of a verb. *Auxiliary verbs*, are those used to assist in conjugating other verbs; as *shall*, *will*, *may*, *can*, *must*, and especially the verbs *to have*, and *to be*. This last auxiliary is used in our own language, in the conjugation of all passive verbs; as he *is esteemed*, the word *was spoken:* and all our passive verbs are formed from the perfect participles of active verbs; but in most of the ancient languages they are single derivative words.

A *participle*, is a word derived from a verb, and often uniting the properties of a verb and a noun or adnoun; as *loving*, *loved*, *having loved*. These three forms are distinguished as the present, perfect, and compound. An *adverb*, is a word used to qualify or explain a verb, or adnoun; as *well*, *wisely*, *there*, *then*. A *preposition*, serves to show the relation of some noun, pronoun, or phrase, to the preceding part of the sentence; as *by*, *to*, *from*, *in*, *with*, *on*, *over*. A *conjunction*, serves to connect words or phrases, and often to qualify their meaning; as *and, if, but, because. Copulative* conjunctions indicate connection or resemblance; as he is good *and* happy: but *disjunctive* conjunctions denote opposition or contrast; as he is rich but not liberal. An *interjection*, is a word expressing emotion, or a call of attention, salutation, or the like: as *Oh! alas! behold! hark! welcome!*

§ 4. *Syntax*, is that part of Grammar which treats of the agreement and dependence of words in a sentence; so named from the Greek, συν, together, and τασσω, I arrange. It is usually divided into *Concord*, or the agreement of one word with another, in gender, number, or person; and *Government*, or the power which one word has over others, in directing their mood, tense, or case. The most important rules of concord, are for the agreement of articles and adnouns with their nouns; of pronouns with their antecedents; and of a verb with its nominative case. Thus, it would be improper to say *an* house; because the indefinite article takes the form *a* before a consonant which is sounded; but the form *an* is used before a vowel, or silent *h:* as an apple. It would be incorrect to say he *are* loved; because the pronoun *he* is in the singular number, and requires that the verb should be of the form appropriated to this number by general usage. The most prominent rules of government, are for one noun governing another in the possessive case; one verb governing another in the infinitive mood; and verbs, participles, or prepositions governing nouns or pronouns in the objective case. Thus, we say, he spoke to *them;* because the word *them* is the objective case of the personal pronoun, in the third person plural, and it is governed in this example by the preposition *to*, which requires it to take this form.

The study of the *Ellipsis*, or allowable omission of such words as would be readily supplied in the mind of the reader, or hearer, is also an important part of Syntax; though in regard to its use, it may also be treated of under Rhetoric. In general we must avoid omitting any words which would impair or obscure the sense; and hence, instead of saying, James will go and see the books to day, and John to-morrow, it would be better to supply the ellipsis, by saying John *will go* to-morrow, or John *will go and see them* to-morrow. The formal application of Accidential and Syntactic rules to the successive words of a sentence, is called *parsing;* and it requires a thorough knowledge of the construction of the sentence; though not always of the exact meaning of the words. Perhaps the best mode of eliciting an exact comprehension of the meaning of sentences, is by asking questions; the answers to which will show that the sense is understood. Thus, in the sentence, "perseverance overcomes all difficulties;" if the question be asked, what it is that perseverance overcomes, the answer is, *all difficulties:* and if it be asked, what overcomes all difficulties, the reply is, *perseverance.* Again, to the question, what effect has perseverance on difficulties, the answer will be, it *overcomes* them.

§ 5. *Prosody*, is that part of Grammar which treats of the laws of versification; including those of punctuation. It is so named from the Greek προς, concerning, and ωδη, an ode or song. *Versification* is the arrangement of a certain number and variety of syllables, according to certain laws; to form what is technically called poetry. Versified poetry is written either in *rhyme*, or in *blank verse*, which has no rhymes; but both are divisible into regular poetic feet; in which they differ from prose. *Rhyme* is a similarity in sound between the last syllables of each two or more verses. A *verse* is properly a single line of poetry; and several lines connected compose a *stanza.*

A *poetic foot*, is an assemblage of two or more syllables; having the long and short ones, or in modern languages, the accented and unaccented, in a certain order; and every verse is composed of such poetic feet. An *iambus*, has one short syllable, followed by one which is long, or accented; as *betray.* Of such feet are the English heroic verse, and the long, common, and short metres, in Psalmody. A *trochee*, has one long syllable, followed by one short; as *hateful.* The *anapest*, has two short syllables followed by one long; as *contravene:* and the *dactyl*, has one long syllable, followed by two short; as *laborer.* These are the feet chiefly used in English poetry, and the only kinds that we have room to mention. The *spondee*, consisting of two long syllables; and the *pyrrhic*, of two short, are occasionally used by the ancient poets. Of the four following lines, the first is iambic; the second, trochaic; the third, anapestic; and the fourth, dactylic, but closing with an additional syllable, which gives it an anapestic cadence.

> "Ye nymphs of Solyma, begin the song."
> "Guide me, Oh thou great Jehovah!"
> "May I govern my passions with absolute sway."
> "Sound the loud timbrel, o'er Egypt's dark sea."

Punctuation, is the application of points, to mark the pauses, and often the sense of a written composition. The points now in use are the *comma*, (,); the *semicolon*, (;); the *colon*, (:); the *period*, (.); the *exclamation* point, (!), appended to something remarkable; and the *interrogation* point, (?), denoting a question. All of these points mark pauses, increasing in length, from the first, to the two last named. The *parenthesis*, ( ), and *brackets*, [ ], are used for subordinate or detached clauses; the *asterisk*, *, the *obelisk*, †, the *binobelisk*, ‡, and *parallels*, ‖, are used for reference; the *apostrophe*, ('), for abbreviating words; the *hyphen*, (-), for connecting words or syllables; the *caret*, (∧), for supplying omissions; and the *ellipsis*, whether dash, dots, or stars, indicates that something is purposely omitted. *Quotation marks*, (" ") enclose a passage taken verbatim from some other author: an *index*, ☞, points out some remarkable passage; and a single or double *brace*, }, { }, is used to connect several lines, which are intimately related; as in poetry, when they rhyme together.

CHAPTER II.

ORIENTAL LANGUAGES.

We class as Oriental Languages, those of civilized Asia; including, on account of their close resemblance, those of Egypt and Ethiopia. The name is from the Latin *oriens*, rising; but it signifies eastern, in allusion to the rising sun. The Oriental Languages are doubtless the most ancient of all; though their relative antiquity is not precisely known. The Hebrew is probably the oldest; and it became known to the nations of Europe, as the language of the Bible, and of the dispersed Jews: but the Arabic was little regarded, till after the downfall of Rome, and the rise of Mohamedanism; when it became, for a time, the chief language of science. The British conquest of India, has attracted the attention of scholars to the Sanscrit tongue: and the labors of religion and commerce have at last introduced us to a partial knowledge of the Chinese: but in these latter tongues, much yet remains to be sought for and investigated. We shall speak briefly of the Oriental Languages, under the four divisions, or families, of Coptic, Semitic, Sanscrit, and Chinese.

§ 1. The *Coptic Language*, was the original language of Egypt; and it is one of the most ancient that are known. It was expressed by the characters commonly called *Hieroglyphics;* so named from the Greek ἱερα γλυφη, a sacred engraving. The earliest hieroglyphics, appear to have been imitations, or natural symbols, of the objects which they expressed; and hence they are classed as figurative and symbolical. Thus, an *eye*, with a sceptre beneath it, signified a *king;* a flying *hawk*, represented the *wind;* and a *crescent*, resembling the moon, was the symbol of a *month*. From these hieroglyphics, were derived the *phonetic characters;* so called because they represented sounds; and which constituted probably the earliest alphabet known. In the phonetic hieroglyphics, each character stood for the sound, or letter, which began the name of the object represented. Thus an *eagle* stood for the letter A; this being the initial letter of *ahom*, the Coptic word for an eagle. On this principle was formed the *Egyptian Alphabet*, (Plate II. No. 1), explained in the following table.

A. *Ahom*, an eagle.	N. *Neph*, an inundation.
B. *Berbe*, a censer.	O. *Osiris*, a dog-headed deity.
E or A. *Aka*, a reed.	P. *Presh*, a mat.
K. *Klaft*, a cup.	R. *Ra*, the sun.
L. *Laboi*, a lion.	S. *Sion*, a star.
M. *Mooŭ*, water.	T. *Tot*, a hand.

This list may serve as a specimen of the phonetic characters; but numerous others were employed in the same manner, and to designate the same letters; though a small number of them seems to have been selected for common use.* All the characters expressing one

* Some of these are shown in Plate II. No. 1; but we have not room to give the Coptic names. No. 4, is the word *ahom*, in Coptic characters.

word, were grouped together; and often, especially in the case of proper names, they were enclosed in an oval line, called, by the French, a *cartouche;* to separate them from other characters. The order of the characters, in the cartouche, was denoted by the direction of the animals' heads: but the general order of hieroglyphic writing was in columns; commencing at the top, and reading the right hand column first, as in the Chinese. (This is exemplified in the names *Ptolemy* and *Cleopatra;* Plate II. Nos. 2, and 3). The phonetic characters were sometimes mingled with the figurative or the symbolical hieroglyphics; but in such cases they were recognised by some distinguishing mark.

The *hieratic* or sacred characters, used for purposes of religion and science, appear to have been partly phonetic, and partly imitative. The *demotic*, enchorial, or common characters, were of later origin; of simpler form, being more abbreviated; and they were applied to a somewhat different dialect, though essentially of the same language. A still later *Coptic alphabet* was derived from the Greek letters, and used about A. D. 120, in a translation of the Bible; from which most of our knowledge of the ancient Coptic or Egyptian language is derived. The knowledge of the hieroglyphic writing was for ages lost to the world: and its modern discovery is amóng the most wonderful achievements of the human intellect. The key to this discovery was the celebrated *Rosetta stone*, dug up at Rosetta, by the French troops under Bonaparte; and now deposited in the British Museum. It contained an inscription, in praise of Ptolemy Epiphanes; triply sculptured in Sacred, Common, and Grecian characters. The mutilated Greek, was translated by Porson and Heyne; De Sacy detected in it the word Alexandria; Akerblad, of Sweden, deciphered most of the demotic characters; Quatremerè identified the language as the Coptic; and Dr. Young discovered some of the sacred characters: but to Champollion, we owe the full developement of the discovery, and its application to many of the inscriptions still extant, on the ruins, and remains, of Upper Egypt.

§ 2. The *Semitic* family of Languages includes the Hebrew, Chaldee, Syriac, Phœnician, Arabic, and Ethiopic languages; with others of minor importance. The name is derived from Shem, the eldest son of Noah; by whose descendants, these languages were spoken. They are all written from the right hand to the left; but each of them in its own peculiar characters. The term *Aremaic*, or Aramean, has also been applied to the Chaldee, Syriac, and some minor tongues; spoken by the descendants of Aram, the fifth son of Shem. The *Chaldee*, or Chaldaic, was the language of the ancient Babylonian and Assyrian empires; and is supposed to have been derived from the Hebrew; which it closely resembles.

The *Hebrew Language*, possesses great interest; as being that in which the Old Testament was originally written; except a few chapters in Ezra, and a few verses in Jeremiah and Daniel, which were in Chaldee. It is supposed, by many, to have been the original language, spoken before the confusion of Babel; though of this we have no positive proof. The characters of the present Hebrew alphabet, are not the most ancient in which this language was written;

but were introduced at a later period, and probably since the Christian Era. The *diacritical signs* or points, both vowels and accents, now generally received, and employed, by Hebrew scholars, are of still later origin; dating back only to about the seventh century of our era. The present Hebrew alphabet is as follows:

1.	א.	Aleph,.......... ā.	12.	ל.	Lāmedh,.........l.
2.	ב.	Bēth,............bh.	13.	מ ם.	Mēm, ...m.
3.	ג.	Gīmel, ...gh.	14.	נ ן.	Nūn,............n.
4.	ד.	Dāleth,..........dh.	15.	ס.	Sāmekh,.........s.
5.	ה.	Hē, ...h.	16.	ע.	Ayin,........... o.
6.	ו.	Vāv, ...v.	17.	פ ף.	Pē,............. ph.
7.	ז.	Zăyin, ...z.	18.	צ ץ.	Tsādhē,......... ts.
8.	ח.	Hhēth,..........hh.	19.	ק.	Qōph, ...q.
9.	ט.	Tēt,.............t.	20.	ר.	Rēsh,............r.
10.	י.	Yōdh,...........y.	21.	ש.	Shin,............sh.
11.	כ ך.	Kăph,...........kh.	22.	ת.	Tav,............th.

The letters *bh*, *gh*, *dh*, *kh*, *ph*, and *th*, by the addition of a point on the left, called a *dāghesh*, are changed to *b*, *g*, *d*, *k*, *p*, and *t*: and *sh*, with a point placed over the left branch, instead of the right, is pronounced like *s*. The letters *a*, *h*, *v*, *y*, and *o*, are frequently silent, or mere aspirations; their sound being taken or sustained by the vowel points. When two characters, in the above alphabet, are given for one letter, that on the left is used only at the end of words. The principal vowel points, attached successively to the letter ב, for example, vary its pronunciation, as shown in the margin. The names of the Hebrew letters, are significant Hebrew words; as *aleph*, (pronounced ah-lef), an ox; *beth*, a house; *gimel*, (or *ghimel*), a camel; and so of the rest.

בָ *baw* or *bŏh*; בַ *bah*;
בֶ or בֵ *bay*; בִ *bee*;
בֹ *bō*; בֻ *boo*; בְ *bĕh*.

The following, is the first verse of the first chapter of Genesis, in Hebrew: and it should be read from right to left; as indicated by the numbers, attached to the words.

[1]בְּרֵאשִׁית [2]בָּרָא [3]אֱלֹהִים [4]אֵת [5]הַשָּׁמַיִם [6]וְאֵת [7]הָאָרֶץ

The pronunciation of this verse according to Stuart, would be, [1]*Be'raisheeth* [2]*bawraw* [3]*Eloheem* [4]*aith* [5]*ha'shawmayeem* [6]*vĕ'aith* [7]*haw'awrĕts*. The signification of the words, is as follows. [1]In the beginning, (from *raisheeth*, a beginning); [2]created; [3]the Deity, (in the plural number); [4, 5] the heavens, (*aith* being a sign of the accusative or objective case, and *ha* the article *the*); [6, 7] and the earth: (*ve* signifying *and*; *awrets*, the earth; and *aith*, and *ha*, as just before mentioned). The *Rabbinic language* of the later Jews, is a dialect of the Hebrew; but written in somewhat different characters. The *Syriac* is also a dialect of the Hebrew, written in a peculiar character, and still used in worship by the Nestorian Christians. The *Phœnician* language, allied to these, was that of Tyre and Sidon, and of Carthage: and from it, Cadmus derived the Greek alphabet.

The *Arabic language*, by means of the Koran, has been preserved unchanged for ages; and has spread as widely as the Mohamedan religion. It has many words in common with the Hebrew;

as the Arabians, through Ishmael, are also descendants from Abraham: but it is written in a more difficult character, and is so copious as to require great labor in learning it. The characters of the *Arabic alphabet* are give in Plate II. No. 5; those on the *right* being used at the beginning, and those on the *left* at the end of words; as they are read from right to left. The *names* of the letters, are given in the following table:

22. Kef, ...ch.	15. Dzad, ...dz.	8. Dal,.....d.	1. Elif, ...a.
23. Lam,....l.	16. Ta, ...t.	9. Dhsal, ..dh.	2. Be, ...b.
24. Mim,....m.	17. Da, ...d.	10. Re, ...r.	3. Te, ...t.
25. Nun,....n.	18. Ain, ...'h.	11. Ze, ...z.	4. Thse,....th.
26. Wau,...w.	19. Gain,....gh.	12. Sin,.....s.	5. Jim,.....j.
27. He,.....h.	20. Fe, ...f.	13. Shin,....sh.	6. Hha,....hh.
28. Ya,.....y.	21. Kaf, ...k.	14. Tsad, ...ts.	7. Kha,....kh.

It will be perceived that several sounds are represented by more than one character, as in the case of our *c* and *k*: but some of the gutteral sounds are such as our letters cannot exactly represent. The letters *elif* and *ain*, like the corresponding Hebrew letters, are often silent; their sound having apparently been usurped by the accents. As a specimen of the Arabic language, we have only room to give the words *Aljăbr*, the reduction; *Alchimia*, the secret; and *Alkŏrān'*, the Reading; (Plate II. Nos. 6, 7, and 8); together with the first verse of the first chapter of Genesis, (No. 9), pronounced and translated as follows: *Awwal*, (in the beginning); *ma*, (indeed); *khalka*, (created); *Allah*, (God); *al-samā*, (the heaven); *w' al-arts*, (and the earth). The *star*, is the character for a period. The Arabic language was written in the characters called *Cufic*, until the present characters called *neski* (or copy hand?) were introduced after the time of Mohamed. The Ethiopic, or Abyssinian language, is written in a peculiar character; but resembles the Arabic, from which it is derived.

The *Tartar* family of languages, comprehends the Mongolian, spoken throughout the greater part of Chinese Tartary; the Tungusian, in eastern and central Siberia; the Turcoman, or Tartar proper, in Independent Tartary; and the Turkish, which is the chief language of both Asiatic and European Turkey. The *Turkish Language*, has borrowed many words from the Persian and Arabic; and is written in the Arabic characters, from right to left. It is said to be full in its construction, but meagre in original words; and sonorous, though somewhat harsh and rough. It is an oriental proverb, that the Arabic language persuades; the Persian flatters; and the Turkish reproves. They say that Adam made love to Eve in Persian; the serpent tempted her in Arabic; and that the Angel spoke Turkish, when he drove that first pair out of Paradise.

§ 3. The *Sanscrit* family of languages, comprehends those of Persia, Hindoostan, Thibet, and Malaya; and perhaps of some other parts of Chin India. For a knowledge of these languages, we are much indebted to the labors of Sir William Jones; who accepted the office of Chief Justice, at Bengal, in order to have better opportunities of studying them. The *Zend* was the language in which Zoroaster wrote his sacred books, called the *Zend-avesta*, or Living

Word: and the *Pehlvi* (or Pehlevi) was the common language of ancient Persia: both being closely allied, it is said, to the Sanscrit. The Guebres or Fire Worshippers spoke the *Parsee;* which also belongs to the Sanscrit family;—and from these ancient languages, the modern *Persian* is chiefly derived. It contains, however, many Arabic words, introduced by the Mohamedan conquest; and it is written in Arabic characters, though slightly altered: but for this reason, unlike the remaining languages of the Sanscrit family, it is written from right to left. It is said to bear much resemblance to the German, both in its structure, and individual words.

The *Sanscrit language* proper, was doubtless once spoken in Hindoostan; but has long been a dead language, used only by the Brahmins, in their sacred books and ceremonics. Its name signifies *perfect;* and the Brahmins also call it *Deva-Nagaree*, (or Devunagari,) signifying the *divine;* as they declare it to be the language of the gods. Its *alphabet*, containing fifty characters, is given in Plate I. No. 10; reading as in the European languages, from left to right. The first sixteen characters are called *vowels*, though some of them embrace consonant sounds: and they are arranged in pairs,—a short and a long vowel together; with a slight distinction in the characters. Thus, the first vowel, *ŭ*, has the *obscure* sound of *u* in *but*, or *a* in *America:* and the names of all the consonants are formed by appending this sound to their own, when in combination; as *kŭ*, *khŭ*, *gŭ*, *ghŭ*, *gnŭ*, and so of the rest.

This alphabet has been said to comprise all the fundamental sounds of all the European languages; and the language itself has been said to resemble the Greek, so much that Gibbon suspected it to have borrowed therefrom: though we think it more probable that the Greeks borrowed from the Sanscrit. The reading of this language, is extremely difficult; owing to the numerous complex characters, formed by uniting two or more letters, in one character, when they occur in the same syllable. The number of these compound letters is not less than five or six hundred; though they resemble the letters from which they are derived. In the specimen of a Sanscrit phrase, given in Plate I. No. 11,—*jŭgŭtung*, (of the worlds); *kārŭkuh*, (the maker); *Krishnuh*, (Krishnoo),—the dot over the third letter, stands for the vowel *ung;* the two dots following, for the vowel *uh;* and the first two characters in the third word are the compound letters, *kri* and *shnŭ;* the straight mark at the end being the mark for a period.

The *Pracrit*, or common language of Hindoostan, comprehends the *Hindostanee*, in the north; the *Bengalee*, in the east; and the *Tamul*, including the Mahratta, Carnara and Telinga, in the south: all of these dialects being derived from the Sanscrit. The mixed languages of Ceylon, and the region around the Indus, are called the *Magadhi* or Misra. The *Bali*, which resembles the Sanscrit, is the sacred language of the Boodhists in Ceylon, Birmah, and Thibet; and is written in peculiar, quadrangular characters. The *Malay* language, which is derived partly from the Sanscrit, though written in Arabic characters, has been called, from its soft, liquid sounds, the

Italian of the East. The language of the European Gypsies is said to differ but little from those of northern India.

§ 4. The *Chinese Language*, is by far the most important of the asyntactic, or, as Adelung terms them, monosyllabic languages, of the east; and it is one of the most ancient languages known. The written language, according to De Guignes and Morrison, contains 214 *keys*, or elementary characters; from which, all the others, more than 13,000 in number, are derived. These keys are evidently of hieroglyphic origin; often having more than one meaning, and sometimes more than one character: and each of them represents a word, usually of one syllable. Of the specimens given in Plate I., the characters *yih*, *shih*, *khow*, *keuen*, *jih*, *yooh*, and *jin*, are keys, or elementary characters; although *shih* would seem to be naturally derived from *yih*;—from which we may see how arbitrary are these distinctions. Again, we observe that the characters *khow*, the mouth, and *keuen*, a dog, being combined, express the idea of *barking;* but the corresponding word, *fey*, has no such resemblance to these words, as the compound character has to its keys. There are two different characters for the same key, *keuen*, a dog; and these two characters combined, express the next word in the plate, *hia*, straight or narrow; showing also how arbitrary are some of the derivations.

While the written language of the Chinese is said to be very rich in combinations, the spoken language appears to be extremely barren. Thus, according to De Guignes, there are five different characters, each pronounced *hō;* eight, pronounced *hô;* seven, pronounced *hò;* nine, pronounced *hó;* and seventy characters, each pronounced *hŏ;* making in all 99 characters, having the same pronunciation, varied only by the accent; and nearly all of them having widely different significations. To designate proper names, the Chinese select certain characters, called *Hing-ching*, which they use *phonetically*, as representing certain sounds: and the characters belonging to one name, are, it is said, sometimes written in a *cartouche*, as in the Egyptian hieroglyphics. The Chinese write their words in columns, from the top to the bottom of the page; beginning on the right side.*

Many scholars have supposed the Chinese characters to be *ideographic*, representing ideas independently of sounds; but Mr. Duponceau has shown, we think conclusively, that they are *lexigraphic;* each representing a word, by means of its pronunciation; as much as do the European languages. The other languages of this family, are the Cochin Chinese, Tonquinese, Japanese, and other minor dialects. The *Cochin Chinese* use many of the Chinese characters; but often to express different words, both as regards the sense, and the pronunciation. The *Japanese* language is said to use a select number of the Chinese characters, introduced in the year 733, but applied to the original Japanese words; which are as different from the Chinese, as English words are from French; though both written with the same character.

* The last column of Chinese characters, on the left side of Plate I. (No. 13), is the inscription on the tablets at the door of the *Chinese Museum*, in Philadelphia. For the honor of possessing this splendid collection, our city and country are indebted to the liberality of one of their most enterprising and patriotic merchants; Mr. Dunn.

Engraved by R. S. Gilbert, Phila.

CHAPTER III.

EUROPEAN LANGUAGES.

The European Languages may be classed in the four families of Pelasgic, Gothic, Celtic, and Sclavonic; the former belonging to Southern Europe, the three latter to Central and Northern. The *Pelasgic family*, includes the languages of ancient and modern Greece and Rome; with those derived from them: while the chief tongues of the *Gothic family*, are the English and German:—and these two families, the Pelasgic and Gothic, are much the most important, of all modern languages, to the civilized world. Except the Greek and Latin, they are languages which were formed during the middle ages of history; that period which produced the nations of modern Europe, partly from the wreck of the Roman Empire.

There is no doubt that all the European languages are of Asiatic origin; and the comparison of them with the more ancient languages, has been a problem of deep interest to the philologist. Thus, the Greek, may be traced to the Phœnician, and Egyptian; the Latin, to the Phœnician and Greek;—while the Italian, Spanish, and French, are immediately derived from the Latin; of course with an intermixture of Gothic words. The languages of Central and Northern Europe probably came from the central and northern parts of Asia; but doubtless from various sources, so intermingled, that their exact origin cannot now be ascertained. Most of the European languages are highly *syntactic;* changing the forms of words, to express variations of number, person, relation, intensity, time and mode, in nouns, adjectives and verbs. Our own language is, perhaps, the least variable, in these respects, among them all.

We proceed to speak briefly of the European languages, in the order of Classification above proposed.

§ 1. The *Pelasgic family* of languages, includes the Greek; the Romaic or Modern Greek; the Latin, Italian, Spanish, Portuguese, and French languages; with the subordinate dialects. The Pelasgians were the oldest inhabitants of Greece: and received their name from Pelasgus, one of their leaders. With them, the Greek and Latin languages both originated; and from these, all the others, of this family, have been derived.

The *Greek language*, is emphatically that of ancient poetry and philosophy. It is remarkable for its copiousness and strength; and for the ease with which its words may be united, to form compounds. Though derived immediately from the Egyptian and Phœnician, it is said to have much affinity to the Sanscrit, both in individual words, and grammatical forms. Its earliest alphabet, that introduced by Cadmus, as already mentioned, (p. 41), was the old Phœnician, containing only 15 letters; to which Υ was soon after added. Four more letters, Ζ, Θ, Φ, and Χ are said to have been invented by Palamedes, during the Trojan war; and the remaining four, Η, Ξ, Ψ and Ω were added by Simonides, about the time of the Persian war, or 490 B. C.

The alphabet, thus completed, was first adopted by the Ionians; hence sometimes called the *Ionic* alphabet. The Ionians first introduced the mode of writing from left to right, about 450 B. C.: previously to which, the Semitic, or inverse order prevailed; or else the method called *boustrophedon*, alternately from right to left, and left to right. The shape of the letters having been changed, from the original *uncial* characters, the following is the Greek Alphabet, with the name and sound of each letter, and its numerical power:

1.	Α, α,	Alpha,	*a* in *far* or *fat.*	50.	Ν, ν,	Nu,	*n.*
2.	Β, β, ϐ,	Beta,	*b.*	60.	Ξ, ξ,	Xi,	*x*, *ks*, or *gz.*
3.	Γ, γ, Ϝ,	Gamma,	*g hard.*	70.	Ο, ο,	Omicron,	*o short.*
4.	Δ, δ,	Delta,	*d.*	80.	Π, ϖ, π,	Pi,	*p.*
5.	Ε, ε,	Epsilon,	*e short.*	100.	Ρ, ρ, ϱ,	Rho,	*r.*
7.	Ζ, ζ, ζ,	Zēta,	*z.*	200.	Σ, σ, ς,	Sigma,	*s.*
8.	Η, η,	Eta,	*e* as in *vein.*	300.	Τ, τ, ͳ,	Tau,	*t.*
9.	Θ, ϑ, θ,	Thēta,	*th.*	400.	Υ, υ,	Upsilon,	*u long* or *short.*
10.	Ι, ι,	Iota,	*i* in *pique* or *pin.*	500.	Φ, φ,	Phi,	*ph.*
20.	Κ, κ,	Kappa,	*k.*	600.	Χ, χ,	Chi,	*ch* or *kh.*
30.	Δ, λ.	Lambda,	*l.*	700.	Ψ, ψ,	Psi,	*ps.*
40.	Μ, μ,	Mu,	*m.*	800.	Ω, ω,	Omega,	*o long.*

The letter *h* is expressed by the *aspirate* (ʽ), as in ἡμων, *of us*; ἁγιασθητω, *be hallowed*; ὡς, *as*; ῥῦσαι, *lead.* To complete the series of numerals, the Greeks used (ϛ), a character called *episemon* for 6; (ϟ or ϙ), *koppa*, for 90; and (ϡ) *sanpi*, for 900. The following is the Lord's prayer in Greek, as given by St. Matthew. (Ch. vi. 9—13.)

ΠΑΤΗΡ ἡμῶν ὁ εν τοῖς ουρανοῖς· ἁγιασθητω το ονομα σου. Ελθετω ἡ βασιλεια σου. Γενηθητω το θελημα σου, ὡς εν ουρανῷ, και επι της γης. Τον αρτον ἡμῶν τον επιουσιον δος ἡμῖν σημερον. Και αφες ἡμῖν τα οφειληματα ἡμῶν, ὡς και ἡμεῖς αφιεμεν τοις οφειλεταις ἡμῶν. Και μη εισενεγκης ἡμᾶς εις πειρασμον, αλλα ῥῦσαι ἡμᾶς απο τοῦ πονηροῦ. Οτι σοῦ εστιν ἡ βασιλεια, και ἡ δυναμις, και ἡ δοξα, εις τους αιῶνας. Αμην.

The signification of some of the words in this specimen of the Greek language, is as follows: πατηρ, father: ἡμῶν, of us, (from ἡμεις, we): ὁ, (the definite article used as a relative): εν, in: τοις ουρανοις, the heavens, (from ὁ ουρανος, the heaven): ἁγιασθητω, let it be hallowed, (from ἁγιος, holy; and ἁγιαζω, I make holy): το ονομα, the name, (το being the neuter gender of the article): σου, of thee, (from συ, thou). Ελθετω, let it come, (from ερχομαι, I come): ἡ βασιλεια, the kingdom, (ἡ being the feminine form of the article). Γενηθητω, let it be done, (from γινομαι, I become): το θελημα, the will: ὡς, as: και, and, or also: επι, upon: της γης, the earth, (επι requiring the genitive or possessive case of ἡ γη, the earth). Τον αρτον, the bread, (the objective or accusative case of ὁ αρτος, the bread): επιουσιον, daily, or suitable, (agreeing with αρτον): δος, give, (from διδωμι, I give): ἡμιν, to us, (the dative case of ἡμεις): σημερον, to-day. We have no room here, interesting though it may be, to pursue the subject farther.

Of the dialects of the Greek language, the *Doric*, spoken in the Peloponnesus, is the oldest, and most harsh; the *Æolic*, spoken in Greece north of the Isthmus, and in Æolis of Asia Minor, resembles the Doric, but is smoother, and more like the Latin language; while the *Ionic*, spoken chiefly in Ionia, and the neighboring islands, is more soft and flowing; and the *Attic*, confined to Athens, and its neighborhood, was the latest, and most refined of them all. The *Modern Greek*, sometimes called the *Romaic*, may be regarded as a dialect of the ancient Greek, in which the terminations are abbreviated and simplified.

The *Latin language*, was that of ancient Rome; and received its name from the Latins, who inhabited that region, before Rome was founded. It was not matured till after the Laws of the Twelve Tables, or 451 B. C. It resembles the Greek, not only from its Pelasgian origin, but from the introduction of Greek words, by the later Greek colonists, and emigrants. The Latin became corrupted among the common people of Italy about the year 581, owing to the northern invasions; but in the Middle Ages, it was the common language of learned men throughout Europe; being the only one in which they could be understood beyond the limits of their own country; so little were the present languages known or cultivated. In England, the Latin was exclusively used in the Courts of Justice, until A. D. 1362; when Edward III., as a favor to his subjects, permitted them to be heard in their own tongue, much less refined, of course, than it now is.

The Latin alphabet is the same as our own; which is borrowed from it, except that the Latin has no letter *w*. We think it clear, that the Continental pronunciation of the vowels, is more likely to be that of the ancient Romans, than the English pronunciation, which is peculiar to itself. We would therefore, in reading Latin, pronounce *a* as in *far* or *fat: e* as in *vein* or *met: i* as in *pique* or *pin: o* as in *note* or *not: u* as in *tune* or *tun: y* when a vowel like *i.: ei* and the Greek ει, like our long *i*, as in *pine: au* and the Greek αυ, like our *ow* in *now:* and *ou*, or the Greek ου, like our *ou* in *tour*, or *oo* in *moon*. The Latin language is remarkable, among others, for what seems to us an inversion of the natural order of words; as in *pater noster*, father our, instead of our father; but whether the former is not the real natural order, if such an one there be, we are not impartial judges to decide.

It may perhaps be interesting here to give some specimens of the manner in which Latin words are varied; particularly in the declension of nouns and adjectives, and the conjugation of verbs. *Dominus*, signifies, the Lord, or a lord; *domini*, of a lord, or of the lord; *domino*, to the lord; *dominum*, the lord; *domine*, Oh lord!; and *domino*, from or by a lord or the lord: this language having no article. The six cases of Latin nouns, here given in order, are called the nominative; the genitive or possessive; the dative; the accusative or objective; the vocative; and the ablative. In the plural, we have *domini*, the lords, or Oh lords!; *dominorum*, of the lords; *dominis*, to, from, or by the lords; and *dominos*, the lords; this latter being the accusative case. *Magnus dominus*, signifies the great lord; *magna terra*, the great earth; *magnum regnum*, a or the great kingdom. *Esse*, is the verb to be; *sum* or *ego sum*, I am; *es*, or *tu es*, thou art; *est* or *ille est*, he is: *sŭmus*, we are; *estis*, ye or you are; *sunt*, they are. *Eram*, signifies I was; *fui*, I was or I have been; *fuĕram*, I had been; *ero*, I shall be; *sim*, I may be; *essem*, I might be; *fuĕrim*, I may have been; *fuissem*, I might have been; *fuĕro*,

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I shall have been; *es* or *esto*, be thou; *fuisse*, to have been; *futurus*, about to be. *Creāre*, to create, in like manner forms *creo*, I create; *creavi*, I have created; *creabo*, I shall or will create; *creëm*, I may create; *creari*, to be created: and numerous other parts. The following is the Lord's Prayer in Latin; by the first two words of which it is often designated.

Pater noster, qui es in coelis, sanctificetur nomen tuum: adveniat regnum tuum: fiat voluntas tua, sicut in cœlo et in terra: panem nostrum quotidianum da nobis hodie: et remitte nobis debita nostra, sicut et nos remittimus debitoribus nostris et ne nos inducas in tentationem, sed libera nos à malo: quia tuum est regnum et potentia et gloria, in secula. Amen.

The signification of these words is as follows. *Pater*, father: *noster*, our: *qui*, who: *es*, art; (from the verb *esse*, to be): *in*, in: *coelis*, the heavens; (from *coelum*, heaven): *sanctificetur*, may it be hallowed; (from *sanctifico*, I make holy, and this from *sanctus*, holy): *nomen*, name: *tuum*, thy; (neuter gender of *tuus*, thy). *Adveniat*, may it come; (from *advenio*, I approach): *regnum*, kingdom: *fiat*, let it be done; (from *fio*, I become; *fit*, it becomes, or it is done): *voluntas*, will; (a noun of the feminine gender): *sicut*, as: *et*, and or also. *Panem*, bread; (acc. case of *panis*): *quotidianum*, daily: *da*, give; (from *do*, I give): *nobis*, to us; (dative case of *nos*, we): *hodie*, this day. *Remitte*, remit; (from *remitto*, I send back): *debita*, debts; (from *debitum*, a debt): *ne*, not: *inducas*, mayst thou lead; (from *induco*, I lead): *tentatio*, temptation: *sed*, but: *libera*, liberate; (from *libero*, I liberate): *à*, from: *malum*, evil: *quia*, because: *potentia*, power: *gloria*, glory: *in secula*, for ages, or forever.

The *Italian language*, is derived immediately from the Latin; differing from it in the introduction of a few Gothic words, but chiefly in abbreviating the terminations of words, and using short auxiliary words, to supply their place. The *Italic* or *sloping characters*, which we occasionally use, are evidently a slight modification of the Roman. This language was for ages a mere corruption of the Latin, and called by the learned, "the vulgar tongue." Sismondi dates its origin at about 1140; under Roger I. of Sicily. Spinello's History, commenced in 1247, was the first learned work in Italian prose; and the Divina Comedia of Dante, written about 1300, stamped the language with character and permanency. This work gave a predominance to the Tuscan dialect; though it is more guttural than the others. It is, however, spoken the most accurately at Rome; as implied by the proverb, "*Lingua Toscana in bocca Romana:*" or the Tuscan tongue in a Roman mouth, the beau ideal of Italian. This language abounds in vowels and liquids; is soft and smooth, and admirably suited for music, poetry, and improvisation.

The Italians pronounce the vowels as we have mentioned for the Latin, except *u*, which they pronounce like our *oo* in *moon*. They pronounce *c* before *e*, and *i*, like our *ch* in *charm; cc* like *t,ch;* and *ch*, like *k*. They pronounce *g* before *e;* and *i*, like our *j; gg*, like *dj; gh*, like *g hard;* and *h*, in Italian, is always silent. They use *j*, only as a vowel, instead of *i* or *ii;* and the letters *k*, *w*, *x*, and *y*, are not found in their language. They pronounce *z* like *dz* or *tz*, and *zz* also like *tz*. The letters *gl*, and *gn*, have often a liquid sound in Italian; like the *lli* in our word billion, or the *ni* in pinion; as in *egli*, he, pronounced *ail-ye;* and *ogni*, every or all, pronounced *own-ye*. This language is remarkable for the manner in which the prepositions are united with the articles; and the pronouns with the verbs, when they come together; forming as it were a single word. Thus the prepositions *di*, of; *da*, from; *a*, to; and *per*, through or by; united with the article *lo*, the; form the compounds *déllo, dállo, állo*, and *pello;* as in *dell' amore*, of the love. Again, instead of *io ti favello*, I speak to thee, the Italians may say *favélloti:* and as the word *gli* signifies to him, they may say *dicévagli*, instead of *éi gli diceva*, he said to him.

The following is the Lord's Prayer in Italian; which will doubtless be understood from what has already been said; at least by comparing it with the Latin.

Padre nostro, che sei nel cielo, sia sanctificato il tuo nome: il tuo regno venga, la tua volonta sia fatta siccome in cielo cosi anche in terra; dacci oggi il nostro pane cotidiano: e rimettici i nostra debiti, siccome noi ancora rimettiamo a nostri debitori: e non inducici in tentazione, ma liberaci dal male; percioche tuo e il regno, e la potenza, e la gloria, in sempiterno. Amen.

The *Wallachian* language is a mere corruption of the Latin: and an impure Latin is still spoken in some parts of Hungary. The Sicilian, Sardinian, and Corsican dialects are very slight modifications of the Italian.

The *Spanish language*, is called by the Spaniards, *La Lengua Castellana;* because it was matured, and spoken in its greatest purity, in the kingdom of Castile. It is derived from the Phœnician of the early colonists, and of the Carthaginian conquerors, mingled with the Latin of the Romans; from which and the language of the Visigoths, a *Romance* language was formed, in Spain, as early as A. D. 623. This Romance tongue, with some Arabic words from the Moors, forms the basis of the Castilian tongue, which, according to Sismondi, dates back to 1050; under Ferdinand the Great. The laws, and documents of Spain, were written in Latin, till 1252; when Alphonso X. published *Las Partidas*, a code of laws, in Spanish. This language abounds in full sounding vowels; though mingled with Arabic and Gothic palatals and gutturals: and, from its solemnity and dignity, it has been termed "the language of the gods." The Spanish alphabet, is the same as ours; only wanting the letter *w*. The Spaniards pronounce the vowels, as we have mentioned for the Latin: but *c* before e, i, and y, they pronounce like our *th; ch*, as in English, in charm; *gu*, when without a diaresis, like *g* hard; *g* before e, i, and y, like *h;* and *j* always like our *h;* while *h* itself is always silent. They pronounce *ll* like our *lli* in billion; and *ñ*, with a *tilde* over it, like *ni* in pinion: these sounds being called liquid; and also found in the Italian. They pronounce *x*, where it comes before a vowel with no circumflex accent, like *h;* and *z* they always sound like our *th*.

The Lord's Prayer in Spanish, is here annexed, to show the close connexion between this language and the Italian and Latin.

Padre nuestro que estas en el cielo, sanctificado sea el tu nombre; venga el tu reino; hagare tu voluntad, asi en la tierra como en el cielo: el pan nuestro de cada dia danos hoy; y perdonanos nuestras deudas, asi como nosotros perdonamos a nuestros deudores; y no nos dejes caer en la tentacion, mas libranos de mal: porque tuo es el reino, y la potencia, y la gloria, por los siglos. Amen.

The *Portuguese language* is the Galician dialect of the old Spanish Romance language, with slight modifications. It became the language of Portugal from the date of its independence, under Alphonso I, A. D. 1139;—or, according to Sismondi, as early as the year 1100, under Count Henry. The delicacy and richness of its songs, has given it the name of the *flower language.* Its literature is of minor importance; but it is the language also of Brazil, and of some parts of India and Africa; and hence it is of considerable interest to the commercial world. The Lord's Prayer in Portuguese, commences as follows: *Padre nosso, que estas nos ceos, sanctificado scio o tu nome; venha tuo regno; scia feita a tua votade, assi nos ceos, como na terra.* From this specimen, its close resemblance to the preceding languages may easily be traced.

The *French language*, is founded on the Celtic, the language of the Gauls; but consists chiefly of abbreviated Latin words, introduced by the Roman Conquest, and by the subsequent use of the Latin language among the learned. By the mixture of the Latin, with the Celtic and Gothic dialects, two distinct *Romance* languages, so called, were formed;—the Southern or *Provençal*, called the *Langue d'Oc*, in which the word *oc* signified yes; and the Northern or *Langue d'Oui*, or, d'Oil, in which *yes* was expressed by the word *oui*. The former, according to Sismondi, originated at the court of Bozon, king of Arles, in 880; and the latter, called also the Romance Wallon, at the court of William Longue Epée, of Normandy, in 930. The Provençal was the language of the troubadours; and is still spoken by the common people in the South of France and east of Spain; bearing, as it does, a resemblance to the Spanish. But when Paris became the French capital, the northern dialect prevailed, and took the national name; though less poetical than the Provençal, and abounding in obscurely sounded vowels. The French is a language rather for oratory, than poetry; and, under the French Academy, it has acquired so much precision, with its vivacity, as to have elicited Voltaire's remark that "whatever is not clear, is not French." It became the language of courts of justice, in place of the Latin, in 1539, under Francis I.: and it is, perhaps, the most common language of European diplomacy; owing partly to the efforts made by the French to give it universal currency. Next to our own language, it is perhaps the most valuable to us, for all the purposes of information and communication.

The French alphabet, differs from ours, only in wanting the letter *w*. The simple vowels in it are pronounced as we have mentioned under the Latin, (p. 57), except *u*, which has a sound compounded of our short *i* and long *u*. The vowel *e*, has often an obscure sound, as in our word *father*, particularly at the end of monosyllables; which, in pronunciation, are therefore joined to the following word. The French have a peculiar class of sounds, called *nasal;* expressed by one or more vowels prefixed to *m* or *n;* these last letters being, as it were, only half pronounced; and partly through the nose. Thus, *am* and *an*, *em* and *en*, have the vowel sound of *a* in *far;* *aim*, *ain*, *ein*, *im*, *in*, *ym*, and *yn*, have the sound of *a* in *fat;* *om*, *on*, and *eon*, the sound of *o* in *on;* and *um*, *un*, and *eun*, the sound of *u* in *dun;* but all ending with the peculiar nasal sound. The diphthong *oi* has the sound of *waw* in English, as in the word *loi*, law, pronounced *lwaw*. The French pronounce, *ai* and *ei* like *a* in fate; *ou* like *oo* in moon; *au*, and *eau* like *o* in note: and to *eu* they give a peculiar sound, between that of *ew* in few, and *u* in fur. They sometimes pronounce ç, before *a*, *o*, and *u*, like *s*, always in these cases writing a *cedilla* underneath it; *ch*, they pronounce like *sh*, except in words from the Greek; *g* soft, and *j* like *zh* or *s* in pleasure; *gn*, and sometimes *l* at the end of syllables, liquid, as in the Spanish; *qu* often like *k;* *r* with a strong aspirate sound; *th* like *t;* and *x* sometimes like *s* or *z:* while final consonants are often silent.

The French articles *un*, a or an, and *le*, the, become *une*, and *la*, before nouns in the feminine gender; and the latter becomes *l'*, (*l*, with an apostrophe), before a vowel; and *les* in the plural. The prepositions *de*, of, and *à*, to, coalesce with the articles, in some of their forms; as in the Italian. The adjectives, change their terminations, for the feminine, and the plural; as *un bon homme*, a good man; *une bonne femme*, a good woman; *les bons garçons*, the good boys; *les bonnes filles*, the good girls. As examples of the pronouns and verbs, we may present the following. *Etre*, to be; *étant*, being: *je suis*, I am; *tu est*, thou art; *il est*, he is; *nous sommes*, we are; *vous êtes*, you are; *ils sont*, they are. *J'etais* or *je fus*, I was; *j'ai été*, I have been; *j'avais été* or *j'eus été*, I had been; *je serai*, I shall be; *je serais*, I should be; *sois*, be thou; *que je sois*, that I may be; *que je fusse*, that I might be; *que j'ai été*, that I may have been; and *que j'euse été*, that I might have been.

The following is the Lord's Prayer in French; from which it will be seen that this language, like our own, is highly *analytic;* expressing by particles, or separate words, those modifications, which the Greek and Latin express chiefly by terminations.

Notre pére qui êtes dans les cieux, que votre nom soit sanctifié: que votre regne arrive: que votre volonté soit faite en la terre, comme dans le ciel: donnez nous aujourd'hui notre pain de chaque jour; et pardonnez nous nos offenses, comme nous pardonnons à ceux qui nous ont offensés; et ne nous abandonnez pas à la tentation, mais délivrez nous du mal: parcequ' à toi est le regne, et le pouvoir, et le gloire, à tous les siècles. Amen. Its correspondence with our own version, will easily be perceived, by a comparison of the words. The *Basque* language, is a peculiar one, spoken by the Gascons, in the S. W. of France; and supposed to have come from the Cantabri, or Biscayans, who once inhabited the north-eastern part of Spain.

§ 2. The *Gothic Family* of languages, includes the English, German, Dutch, Danish, Swedish, and Icelandic languages; with some minor dialects. These are also called *Teutonic;* from the Teutones, who migrated south from the Danish islands, and claimed descent from *Tuiscon* or *Thuisco*, an ancient god or hero. The term *Teutonic*, is also sometimes applied to a supposed ancient language, from which those of this family are said to have been derived. The *Runic* alphabet, containing 16 characters, some vestiges of which are supposed to have been found in America, as proofs of its discovery by the Northmen, appears to have been used by the Scandinavians, and Germans, from A. D. 1200, or earlier, to about 1449.

The *English language*, clearly belongs to the Gothic family; both from its grammatical construction, and the origin of a large majority of its words. As England was originally inhabited by the Celts or Gaels; then passed for a time under the Roman yoke; was next overrun by the Saxons from Germany; subjugated afterwards by the Danes, whose language was like the Saxon; and finally conquered by the Normans, from the northern part of France: our language, therefore consists chiefly of *Teutonic* or German words from the Saxons; mingled with a few *Celtic* words from the aborigines; with still more of *Latin* from the Romans; and of *French* from the Normans;—to which have been added occasional words from the Greek, Hebrew, Arabic, German, French, Spanish and Italian; introduced by travellers, artists, or philosophers. Thus, our terms of war, are chiefly from the French; and of music, from the Italian; many of which still retain their foreign form. Our language, as we have already mentioned, was first permitted to be used instead of the Latin, in courts of justice, under Edward III., in the year 1362.

The English language is irregular, and heterogeneous; but simple in its construction; and strong, flexible, copious, and expressive in its diction;—worthy of a free and intelligent race. It contains about 60,000 words; including technical terms, but excluding proper names. Of these, there are probably 30,000 nouns; 10,000 adnouns; 12,000 verbs; and 5,000 adverbs; not to mention the minor parts of speech. The English alphabet, is like most others, imperfect; containing some superfluous letters; while there are some sounds, particularly of the vowels, for which it presents no separate character. It may be of interest to observe, for example, that in the last syllables of the words *cedar*, *wafer*, *nadir*, *honor*, *sulphur*, and *zephyr*, the vowels *a*, *e*, *i*, *o*, *u*, and *y* are all sounded alike. The preceding chapter on General Grammar, though explaining the principles of language in general, has a special reference to English Grammar; which, as the subject ought to be familiar, will, we trust, excuse any farther notice of our own language in this place.

The *Saxon* language, though now obsolete, is interesting, as the basis of the modern English. As Saxon words are often quoted in our Etymological Dictionaries; we have thought it advisable to introduce the Saxon alphabet, with its peculiar characters, in this place. It is evidently borrowed in part from the Roman alphabet; and was used, we believe, by King Alfred, in his translation of the Psalms into the Saxon tongue.

A	a	a.	K	k	k.	S	ʃ	s.
B	b	b.	L	l	l.	T	ꞇ	t.
C	c	c.	M	m	m.	U	u	u.
D	ꝺ	d.	N	n	n.	V	v	v.
E	e	e.	O	o	o.	W	ƿ	w.
F	ꝼ	f.	P	p	p.	X	x	x.
G	ᵹ	g.	Q	cƿ	q.	Y	ẏ	y.
H	h	h.	R	ꞃ	r.	Z	z	z.
I	ı	i.	Th Ð, ð, þ			That ꝥ.	And ⁊.	

The following is the Lord's Prayer in Saxon, as written about A. D. 900. *Uren Fader thic arth in Heofnas, sic gehalgud thin noma, to cymeth thin ric, sic thin willa sue is in Heofnas and in Eortho. Uren hlaf ofer uirthe sel us to dæg, and forgef us scylda urna sue we forgefan scyldgum urum, and no inlead urith in custnung, al gefrig urich from ifle. Amen.*

The *German language*, is called by the Germans, *die Deutsche Sprache;* the name being derived from *Tuisco*, son of Theut or the earth, from whom the Germans claim descent. It is stated that Ulphilas, bishop of the Mœsogoths, invented a Gothic alphabet, as early as A. D. 360; when he translated the New Testament into the Gothic language. With this version, the modern German so nearly agrees, as to show that its changes, since that time, have been comparatively slight. Charlemagne began a German Grammar; and made great efforts to improve the language. Luther's translation of the Bible, made in 1530, is still nearly as correct a model of the German, as our own Bible is of the English. The chief dialects of this language, are the *Low German*, in the North; the *Franconian*, in the centre, particularly along the River Maine; the *Alemannic*, which was the dialect of the Minnesingers of the middle ages, in Suabia and Bavaria; and the *Upper German*, in the southern or mountainous parts. The *High German*, which is spoken the purest in some parts of Hanover, is the standard of the language; according to the best speakers and authors. It is a rich language, and, like the Greek, admits of compounding words with great facility.

Most German books are printed in the character called *German text;* the small letters of which closely resemble the old English, or black letter character; but the capitals are more rounded; as in the German alphabet here given.

𝔄	𝔞	a.	ℌ	𝔥	h.	𝔒	𝔬	o.	𝔘	𝔲	u.
𝔅	𝔟	b.	ℑ	𝔦 𝔧	i.	𝔓	𝔭	p.	𝔙	𝔳	v.
ℭ	𝔠	c.	𝔎	𝔨	k.	𝔔	𝔮	q.	𝔚	𝔴	w.
𝔇	𝔡	d.	𝔏	𝔩	l.	ℜ	𝔯	r.	𝔛	𝔵	x.
𝔈	𝔢	e.	𝔐	𝔪	m.	𝔖	ſ 𝔰	s.	𝔜	𝔶	y.
𝔉	𝔣	f.	𝔑	𝔫	n.	𝔗	𝔱	t.	ℨ	𝔷	z.
𝔊	𝔤	g.									

The Germans pronounce 𝔞 nearly as in our word fall; 𝔞𝔢 or 𝔞́, (ä) nearly like *a* in fat; 𝔢 nearly like *a* in fate, or like our short *e;* 𝔦 and 𝔶 like the French *i* in pique, or like our short *i* in pin; 𝔬 as in English; 𝔬𝔢 or 𝔬́, (ö) like the French *eu*, between our *ew* in few, and *u* in fur; 𝔲 like *oo* in moon, or in soon; and 𝔲𝔢 or 𝔲́, (ü) like the French 𝔲, composed of our short *i* and long *u*. They give to ei or ey, the sound of our long *i* in pine; and to ai nearly the same sound; to au the sound of our *ou*, in thou; to eu a peculiar sound, compounded of our short *u* or *uh*, and short *i* or *ih*, the latter heard slightly; and aeu or äu, has a sound nearly the same, but rather more like our *oi*. They pronounce sch like our *sh*; and to ch final, they give a peculiar guttural sound, or hard breathing, in which the sound of *k* is very slightly heard. They pronounce th like simple t; v like *f*; and w with a sound between that of our *w* and *v*.

A few examples of the construction of the German language must here suffice. *Ein mann*, a man; *eines mannes*, of a man; *eine frau*, a woman, or lady; *ein haus*, a house. *Der vater*, the father; *die mutter*, the mother; *das buch*, the book; *der gute knabe*, the good boy; *des guten knaben*, of the good boy; *dem guten knaben*, to the good boy; *den guten knaben*, the good boy, (in the accusative case). *Sein*, to be; *seiend*, being; *ich bin*, I am; *du bist*, thou art; *er ist*, he is; *sie ist*, she is; *es ist*, it is; *wir sind*, we are; *ihr seid*, you are; *sie sind*, they are. *Ich war*, I was; *ich bin gewesen*, I have been; *ich werde sein*, I shall be; *ich würde sein*, I should be; *ich würde gewesen sein*, I should have been; *sei* or *sei du*, be, or be thou. *Haben*, to have; *ich habe*, I have; *ich hatte*, I had: *ich habe gehabt*, I have had. *Er liebet mich*, he loves me; *sie lieben ihn*, they love him; *sie lieben sie*, she loves her, or she loves them. The following is the Lord's Prayer in German; from which the resemblance of this language to our own may be clearly perceived:

Unser Vater, der du bist im Himmel, geheiliget werde dein Name. Dein Reich komme; dein Wille geschehe auf Erden, wie im Himmel. Unser täglich Brodt gieb uns heute. Und vergieb uns unsere Schulden, wie wir vergeben unsern Schuldigern. Und führe uns nicht in Versuchung, sondern erlöse uns von dem Uebel. Denn dein ist das Reich, und die Kraft, und die Herrlichkeit, in Ewigkeit. Amen.

The *Dutch language*, is merely a dialect of the Low German, and is now of minor importance. The *Danish* language, is a combination of the Low German with the Scandinavian or original Norman; and was first cultivated by the Scalds, or bards, who sang the praises of their heroes. The *Swedish* language, resembles the Danish, so closely that the Danes and Swedes can read each other's writing. The *Norwegian*, is nearly the same as the ancient Scandinavian; but it is of very little importance; having never been reduced to writing. The *Icelandic*, is also supposed to be the Scandinavian, or original Norman, nearly pure.

§ 3. The *Celtic family* of languages, comprehends the Gaelic, Welsh, Irish, and Armoric; all of which come from the Celts, Gaels, or Gauls; who migrated, in remote times, from Asia; settled in France; and thence, spreading northward, were the earliest inhabitants of Great Britain. They were called Κελται by the Greeks, but styled themselves Gaels. Their languages are now of minor importance. The *Gælic* or Erse, is the language of the Highlanders of Scotland; but a dialect of Saxon origin is spoken in the Lowlands. In its construction, it is said to resemble the Hebrew. The *Welch* language, is still spoken in Wales; the name of which comes from the French *Galles*, of the same origin as Gaelic; which some derive from the German *wallen*, to wander. The *Irish*, was a written language, probably as early as the 10th century; and is said to resemble the Gaelic so much, that the Irish and the Scotch Highlanders can converse with each other, and be mutually understood. The *Manks*, (or Manx) dialect, spoken on the Isle of Man, is similar to the Irish. The *Armoric* or Cimbric language, is the old Celtic, with a mixture of the German; and is still spoken in Brittany; that is, the north-west part of France. The *Cornish*, or dialect of Cornwall, in England, is a corruption of the Armoric.

As a specimen of the Celtic languages, the following copy of the Lord's Prayer in Welch, is deemed worthy of insertion. *Ein Tad, yr hwn wyt yn y nefoedd, sancteiddier dy enw: deled dy deyrnas: gwneler dy ewyllys, megis yn y nef, felly ar y ddaear hefyd; dyro i ni heddyw ein bara beunyddiol; a maddeu i ni ein dyledion, fel y madr deuwn ninnau i'n dyledwyr; ac nac arwain ni i brofedigaeth; eithr gwared ni rhag drwg: canys eiddot ti yw y deyrnas, a'r nerth, a'r gogoniant, yn oes oesoedd. Amen.*

§ 4. The *Sclavonic family* of languages, includes the Polish, Russian, Bohemian, Illyrian, and Croatian; all of which may be traced to the ancient Sarmatians, since called Sclavonians; who migrated from Asia, at a later period than the Germans. Their language is said to have been derived from the Sanscrit: and to have affinities with the Greek and German. The *Polish language*, has been less cultivated, on account of the former prevalence of the Latin, among the clergy and nobles of Poland; but it is respectable in regard to literature. It is hard and harsh to pronounce; and is properly written in a peculiar character. The Poles pronounce *c* like our *ts*; *ch* guttural like the German; *cz* like our *ch* in charm; *sz* like our *sh*: *szcz* like *shch*; *rz* like *zh* or *s* in pleasure; *g* always hard; *j* like our *y*: and *w* like our *v*.

The *Russian language*, comprises several dialects; and is spoken, from Poland, eastward to the Pacific Ocean. It resembles the Polish; but has a mixture of Greek, Swedish, and Tartar words, with the Sclavonic. Its alphabet was introduced by Cyril, and improved by Kopiewitsch; and now contains 36 letters. It is pronounced like the Polish. The oldest known writing in Russian, is Oleg's Treaty, dated 912; but Lomonosoff first adapted the language to poetry, by assimilating it to the German; about A. D. 1742. The old *Sclavonic* language, has been preserved by the translation of the Bible; and is still employed in sermons; though differing considerably from the Russian. The *Crotian* and *Illyrian* languages resemble the Russian; as the *Bohemian* does the Polish.

As a specimen of the Sclavonic languages, we here insert the Lord's Prayer in Russian; using the Roman characters.

Otshe nash, eje esi na nebesach; da svyatitsya imya tvoye da priedet tzarstvye tvoe: da boodet volya tvoya, yako na nebese ee na zemle chleb nash nasooshnie dajd nam dnes: ee ostave nam dolge nasha yakoje ee me ostavlyaem doljneekom nashim: ee ne vovede nas vo iskooshenie no eezbave nas ot loocavago: yako tvoe est tzartzvo, ee sland vo vekee vehor.

The following is the Russian alphabet; with which our notice of the European languages must be closed.

А	а	a	Л	л	l	Ч	ч	tsh
Б	б	b	М	м	m	Ш	ш	sh
В	в	v	Н	н	n	Щ	щ	shtsh
Г	г	g hard	О	о	o	Ъ	ъ	’
Д	д	d	П	п	p	Ы	ы	ii
Е	е	ĕ	Р	р	r	Ь	ь	i
Ж		j *or* zh	С	с	s	Ѣ	ѣ	ye
Ѕ	s	z	Т	т	t	Є	Э	é
З	з	z	Ү	у	u *or* oo	Ю		yu
И	и	ē *or* i	Ф	ф	f	Я	я	ya
І	i	i	Х	х	kh	Ѳ	ѳ	th
К	к	k	Ц	ц	ts *or* tz	Ѵ	ѵ	v

CHAPTER IV.

BARBAROUS LANGUAGES.

Under the branch of Barbarous languages, we comprehend the original tongues of America; of Africa, excepting Egypt and Ethiopia; and of Oceanica, or the Islands south and east of Asia. The name is derived from the Greek, Βαρβαρος, a term which was applied to all foreigners, and thence to all who did not pronounce the Greek language accurately; and ultimately to all ignorant and savage nations. The languages of this branch, though more numerous than all the preceding, are of much less importance;—being devoid of literature; unwritten, except by recent missionaries; and each spoken only over a small region, by a single tribe. In the little which can here be said of them, we shall divide these languages into three groups;—the American, African, and Oceanic;—according to their geographical localities; which also accord with their analogies to each other.

§ 1. The native *American*, or Ind-American languages, are mostly polysynthetic, and polysyllabic: several of our words being expressed by one of theirs; and this one consisting of several syllables. Humboldt grouped them in two classes; the Apalachian, in the north; and the Toltecan, in Mexico and the south. For the knowledge of them now possessed, we are much indebted to the labors of Heckewelder, and the researches of Duponceau. Concerning their origin, nothing certain is known: but they may probably be traced back to Asia; and many of them are said to be copious, precise, and artificial in their structure. They have been gradually supplanted; by the English, in North America; the Portuguese, in Brazil; and the Spanish, in Mexico, and the South American Republics;—so that some of them are already extinct.

The *Esquimaux*, or Karalit language, is spoken by the Indians of this name, on the northern, and north-eastern coasts of America; including Greenland. It is said to resemble that of the eastern Siberians; but to have no resemblance to the languages of Europe. The *Iroquois* language, in several dialects, is, or was spoken by the Six Nations, so called; as also by the Wyandots, or Hurons. It is said to be wanting in labials; but very sonorous. The *Delaware*, called also Mohegan, Algonkin, or Lenape, was diffused, with slight variations, from Nova Scotia to the Mississippi; north of the Ohio River, and the Potomac. Dialects of it, are still spoken, by the Chippeways, Shawnees, Ottawas, and Winnebagoes. The *Floridian* languages, were those spoken in our Southern States; including the Creek, Cherokee, and Choctaw. The original and recent alphabet, mostly syllabic, invented by Guest, or See-quah-yah, a native Cherokee, is a literary curiosity, which we have no room to transcribe.

As a specimen of the Ind-American languages, the following copy of the Lord's Prayer, in the Massachusetts language;—taken from the translation of the Bible by Eliot, the devoted and early missionary to the Massachusetts tribe of Indians, near Boston,—is the most interesting that we can offer. *Nooshun kesukqut quttianatamunach koowesuonk. Peyaumooutch kukketassootamóonk, kuttenantamóonk nen nach ohkeit neane kesukqut. Nummeetsuongash asekesukokish assamainnean yeuyeu kesukok. Kah ahquoantamaiinnean nummatcheseongash, neane matchenehukqueagig nutahquontamóunnonog. Ahque sagkompagunaiinnean en qutchhuaouganit. webe pohquohwussinnean wutch matchitut. Newutche kutahtaunn ketassootamóonk, kah menuhkesuonk, kah sohsumóonk micheme Amen.* The translation of the above, commences as follows. *Nooshun*, our father; (from *noo*, our); *kesukqut*, in heaven: *quttianatamunach*, be hallowed; *koowesuonk*, thy name, (from *koo*, thy). *Peyaumooutch*, may it come; *kukketassootamóonk*, thy kingdom; *kuttenantamóonk*, thy will; *nen nach ohkeit*, on the earth; *neane*, as; *kesukqut*, in heaven. Thus much must suffice, to give some idea of the structure of the languages, formerly spoken, in the goodly land which we now inhabit.

The *Mexican* languages, are numerous; but the *Aztec* or ancient Mexican, and the *Tarascan*, are the most prominent. The *Poconchi* was spoken in Guatemala; and the *Caribbee* was the native language of the West Indies, and the northern parts of S. America. The *Quichua*, was the language of Peru and her Incas; and is said to have abounded in vowels and soft sounds. A specimen of the sounds, in some of these languages, will be found in the names of some of the Indian deities, in the subsequent chapter on Paganism. The *Araucanian*, or native language of Chili, is also described as a distinct one, very rich and harmonious.

§ 2. The *African languages* are very imperfectly known, and important only as the means of introducing civilization and Christianity into that benighted region. Adelung estimates their number at 270; and Seetzen at 150; but not more than 70 or 80 of them have been studied by learned men. The Coptic, Arabic, and Turkish, spoken in Egypt and the Barbary states, and the Ethiopic, in Abyssinia, we have already described among the Oriental languages. The

Berber, or Breber, and the *Shelluh* tongues, are spoken along the Atlas Mountains, and on the Great Desert; being derived probably from the ancient Numidian. The *Mandingo* is used in the western parts, from the Senegal to the Niger; and the *Guinea* dialects, along the coast, are extremely rude and various. The *Hottentot*, and *Bosjesman* languages, of Southern Africa, are said to differ from all others in a sort of clucking noise, like that of a fowl, accompanying every word. The *Caffre* dialects in the south-east, are said to be distinct and peculiar; but the *Zanguebar* dialects in the east, form a group having a common origin. The *Tigré* or *Gheez*, the literary language of Abyssinia, and the *Amharic* or common language, are probably corruptions of the Arabic.

§ 3. In the *Oceanic group* of languages, we comprehend those which are peculiar to the Islands south and east of Asia. The *Malay*, which is spoken on the coasts of Sumatra, Java, Borneo, and the Philippine Islands, we have already mentioned, among the Oriental languages. (p. 53). The languages of *New Zealand*, and of the *Society* and *Sandwich* Islands, have a common origin, probably from the Malay; and they much resemble each other. They have been reduced to writing by the labors of Missionaries; and the way is thus opened, for the light of truth, among those who sat so long in the darkness of error and ignorance. The Negro languages of *New Holland*, *New Guinea*, and the contiguous islands, are extremely rude, but as yet are little known to the learned world.

With the Lord's Prayer in the language of the Sandwich islanders, we must conclude our illustrations of the department of Glossology. *E ko makou Makua iloko o ka lani, e hoanoia kou inoa: e hiki mai kou aupuni: e malamaia kou makemake ma ka honua nei, e like me ia i malamaia ma ka lani la: e haawi mai ia makou i keia la i ai na makou no neia la: e kala mai hoi ia makou i ka makou lawehala ana, me makou e kala nei i ka poe i lawehala i ka makou. Mai hookuu oe ia makou i ka hoowalewaleia mai; e hoopakele no nae ia makou i ka ino: no ka mea, nou ke aupuni, a me ka mana, a me ka hoonaniia, a mau loa aku. Amene.*

II. DEPARTMENT:

PSYCHOLOGY.

In the department of Psychology, we would include those branches of knowledge which relate more immediately to the human mind, its powers, and their cultivation. The name is derived from the Greek ψυχη, signifying the soul, spirit, or mind, in its widest sense; and we would embrace under it the branches of Rhetoric; Logic; Phrenics, or Mental Philosophy; Ethics, or Moral Philosophy; and Education. It comprehends, therefore, that important study inculcated by Thales, the ancient sage of Miletus; *know thyself;* (Γνωθι σεαυτον); inscribed on the temple of Apollo, at Delphi. It stops not, however, at the boundaries of ancient or classic wisdom; but soaring at once to the source of all intellectual truth, the book of Divine Revelation, it there derives sublimer views of the nature and destiny of man.

Although we cannot fully comprehend our own nature; but, in examining the mind abstractly, find ourselves lost in mystery and uncertainty; still we can investigate its faculties; its modes of acting; its incentives to action; its instruments and objects; its appetites and its passions; with the means of governing, directing, and applying all these, to the attainment of man's chief pursuit, the happiness of himself and his fellow-men, and the glory of his Creator. In making such an investigation, we find that we are complicated beings; immortal spirits tenanting houses of clay; but destined soon to leave them for another and an eternal state. Thus, in studying our relations both to the material and the spiritual world, we lay the foundations of all other knowledge; and derive lessons of the greatest practical importance.

The department of Psychology, like the preceding one, may be considered as introductory to all the remaining divisions of human knowledge; since the mind is the agent which embraces and pursues them all. Thus, Psychology is the immediate basis of the studies of Law, and Government, and of Religion; which studies are often included together with it, wholly, or in part. To these high studies, the whole subsequent province of Ethnology, or the study of nations, may be regarded as subsidiary; while it furnishes rich materials for the illustration of Psychology. The Physical Sciences and Arts, are less closely connected with this department:—but even to them, a knowledge of our faculties, and the extent to which they may be relied upon, may be of essential service: for the mind, it is, which has developed these stores of knowledge, and applied them to the preservation and comfort of its own incarnate existence.

It is true that the study of the human mind embraces two great divisions; the one, *Intellectual*, relating to the perceptive and reasoning powers; the other, *Moral*, relating to the affections, passions, and sentiments: but these are so closely and mutually connected, that although constituting distinct *branches*, we think that they belong to the same *department* of human knowledge. Indeed, we regard the latter as the sequel of the former; and Education, in its widest sense, as the great application of them both. In both these divisions of Psychology, various conflicting theories have been proposed; some of which we have already mentioned, in speaking of the Ancient Schools of Philosophy; (p. 19); and others will be referred to, under the branches of Phrenics and Ethics. The existence of these conflicting opinions, is by no means surprising, when we consider the inherent difficulty of the subjects: and it should be observed, that they relate only to particular points; some of which are rather nominal than real; and others of which have already been completely decided.

We proceed to treat successively of the branches of Psychology, in the order already named: Rhetoric; Logic; Phrenics, or Mental Philosophy; Ethics, or Moral Philosophy; and Education.

CHAPTER I.

RHETORIC.

Rhetoric, is that branch of knowledge which investigates the principles and rules of writing and speaking, or the subjects of Composition and Elocution. The name is derived from the Greek, ῥητωρ, an orator; and this from ῥεω, I speak. The term, *Oratory*, derived from the Latin, is properly synonymous with Rhetoric: but the term *Elocution*, from the Latin, *eloquor* or *loquor*, I speak, should, we think, be confined to the manner or process of enouncing or delivering a discourse already composed. Rhetoric, also, in its primary sense, might seem to denote merely the art of declaiming: but this is so closely allied to the art of writing, or composing, that the term was extended, even by the ancients, to include them both. The study of Rhetoric, is, of course, especially useful to the public writer, or speaker: and it is one of the studies which are introductory to *Criticism;* an art, of which we have already spoken. (p. 37).

Some persons have supposed, that the study of Rhetorical rules is likely to cramp and injure the mental powers. This may be the case with some of the artificial, or mechanical systems, which have been proposed; but certainly a knowledge of the general principles on which all good writing and speaking must be founded, cannot fail to be useful, to those who are seeking for eminence in these important acquirements. In this, however, as in other arts, a knowledge of principles and rules, can never supply the place of *practice;* and that practice should be under the eye of just and intelligent criticism. Neither can all the aids of Rhetoric, make a first rate orator; without knowledge, and good sense, brought to bear on the subjects of discourse; and dignity, sympathy, and integrity to give them force.

The best work of the ancients, on Rhetoric, is that of Aristotle; which is the earliest extant; and which still forms the basis of this branch of knowledge. Demosthenes, the greatest of ancient orators, taught much in his dictum, or saying, that *action*, meaning energy and earnestness, is the essence of Eloquence. Cicero, was a graceful, rather than energetic speaker; but his writings are fine illustrations of Rhetoric. Quintilian (or Quinctillian), in his Institutes, (*Institutiones Oratoriæ*), gave many excellent precepts; but he encumbered the subject with treatises on Morals and Education, Law and Politics; which, however valuable to the Orator, are beyond the legitimate limits of Rhetoric. Longinus, in his Treatise on the Sublime, has well treated a noble topic, which we think belongs to Rhetoric; and one which has been amplified upon, in modern times. Of modern works on Rhetoric, Dr. Blair's is probably the most popular; but Dr. Campbell's Philosophy of Rhetoric, and Abp. Whately's Elements, are considered the most profound. So much of the latter work as treats of Conviction, we think, with great deference, belongs more properly to Logic.

We proceed to give a general view of Rhetoric under the heads of Qualities of Style; Figures of Speech; Principles of Taste; Objects of Composition; Management of a Discourse; and Principles of Elocution.

§ 1. *Style*, in literary compositions, is the manner in which ideas are expressed; and it refers to the writer's modes or habits of thought, as well as to the choice of words, in which his thoughts are embodied or clothed. All the qualities of style, may be included under the three topics of perspicuity, energy, and elegance. A *perspicuous* style, is one which expresses ideas clearly and distinctly, and without any ambiguity, or uncertainty, concerning the author's meaning. Perspicuity requires that we should conceive of things distinctly in their nature; completely in their parts; comprehensively in their relations; and methodically in their order or place. In regard to individual words, it requires *propriety* and *precision;* or the selection of those words that convey the sense intended, and nothing more nor less. *Purity* of language is often classed with propriety and precision; but it belongs rather to elegance of style than to perspicuity; for language may be perspicuous, without being pure; though such language can hardly be termed proper; and certainly not elegant. In regard to sentences, perspicuity requires that they should not be too long, or involved; and that they should succeed each other in proper order and relation.

An *energetic* style, expresses ideas forcibly and vividly, so as to stimulate the attention, impress the judgment, excite the imagination, and arouse the feelings, of the reader or hearer. It requires, for the most part, *brevity* or conciseness, and *particularity* or specificness of thought and diction. It selects the most prominent points of description or argument, presents them in the strongest light, and with the most striking colors; using but few words, and those the most distinct and expressive. Energy of style is most forcibly illustrated, not by a single sentence, but by a *train* of ideas, rolling on like a mountain torrent, and bearing away with them the judgment and the feelings of those who read or listen. An *elegant* style, is one that pleases the ear and the taste, by a natural and easy flow of ideas, clearly and classically expressed. It requires *euphony* and *purity* of words and phrases; that is, that they should be neither harsh, quaint, nor vulgar: foreign, nor barbarous; but such as are used by the best writers and speakers. It requires also *unity* and *congruity* of sentences; in order that the ideas may be clearly and easily conveyed. We may here remark, that an affectation of French, Latin, or other foreign words, renders the style *barbarous;* and generally detracts from its elegance: but when appropriate English words can be selected, of which the sound alone would convey an idea of the signification, it adds both force and elegance to the composition.

A *diffuse* style, is one in which more words are used, than are necessary to convey the intended meaning;—the ideas being more or less repeated. A diffuse style is generally *feeble*, or wanting in force, unless occasionally employed with a view to dwell upon some important point; whereas a *concise*, or brief style is generally *nervous* or spirited. A style which is wanting in perspicuity, is said to be *obscure:* and one which is deficient in energy, is said to be *tame*. A *simple* style, in opposition to an *affected* one, is that in which the more common and familiar words, and collocation, are used, to express the ideas intended to be conveyed. A style is termed *dry*, *plain*, *neat*, or *flowery*, in reference to the degree of ornament; the latter using digressions, illustrations, and figures of speech freely; while in the former, they are scarcely used at all.

§ 2. *Figures of Speech,* are peculiar modes of expressing, or impressing ideas; serving to enrich language, to adorn, or dignify style, and to render the subject more attractive or striking. They abound in the most ancient writers; and are beautiful, when properly introduced; but like other ornaments, they should be used sparingly and with discrimination. These figures which refer only to individual words, are called *Tropes*. We have only room to describe briefly the principal figures of speech, in a classified order.

A *Simile*, is a *Comparison* of one thing with another, to show the resemblance or contrast between them; and it is usually expressed by the introduction of the words, *like*, *as*, or *so:* as in the sentence, "an able minister, like a pillar, upholds the state." A *Metaphor*, is a comparison in a concealed form; substituting for one idea, another, to which it should have a clear and congruous resemblance: as, "an able minister is a pillar of the state." An *Allegory*, is a continued metaphor, or series of metaphors; such as the fables and enigmas of antiquity; and the parables of Scripture. A beautiful allegory is found in the comparison of Israel to a vine, in the 80th Psalm.

An *Antithesis*, expresses, not a resemblance, but a contrast, to make the idea more striking; and it is often used in epigrams. *Irony*, is the figure, by which we express the very contrary of what we mean; in order to convey that meaning more vividly; as when Elisha said to the priests of Baal, "Cry aloud, for he is a god." An *Hyperbole*, is an exaggeration, or a diminution of our meaning, to express it more strongly;—a figure which should be sparingly used. The common comparisons, "as white as the snow," "as bright as the sun," "as swift as the wind," and the like, are often hyperbolical. A *Climax*, or Amplification, is an arrangement of ideas in an ascending series; the last step in which should be the most important. The reverse of this, is called an *Anticlimax;* and sometimes used to convert the sublime into the ridiculous.

A *Metonymy*, or change of name, is a substitution of cause for effect; of the container, for the thing contained; the sign, for the thing signified; or the reverse of these: as when we say, "they are reading Milton," meaning Milton's works. A *Synecdoche*, is a substitution of the whole for a part, or a part for the whole: as, "a fleet of twenty sail," for a fleet of twenty vessels. A *Metalepsis*, is an indirect mode of expression; as, in the phrase, "Troy was," to signify that Troy exists no longer. *Interrogation*, is that figure by which we put in the form of a question, what we intend most strongly to assert or deny; as, "Hath he said it, and shall he not do it? or hath he spoken, and shall he not make it good?" *Personification*, or Prosopopeia, is an attribution of life and action to inanimate objects; as when we speak of "smiling nature:" and an *Apostrophe*, is an address to a person who is absent or dead, as if he were really present. Lastly, *Vision*, one of the boldest figures, represents something past, or distant, as actually appearing or transpiring, before our eyes; as when Cicero says, "I seem to myself to behold this city, the light of the world, and the citadel of all nations, suddenly involved in one general conflagration."

§ 3. *Taste*, is the power of distinguishing, and appreciating, that which is excellent, in nature or art. It is allied to *Genius*, or the power of planning and executing works of art; but taste merely judges of their merits, after they are planned or executed. We regard taste and genius, as partly of spontaneous, and partly of cultivated growth; and their only sure model or standard, is the united sanction of the best judges, in all ages and nations. Individuals, and even nations, may differ in their estimate of qualities and merits; but that which has obtained the consentaneous approbation of the best judges, in all ages and nations, may safely be deemed conformable to the principles of our nature, and safely held up to view as a model, or standard, of excellence. Fine taste implies both delicacy and correctness; and the chief attributes on which it is exercised, are Sublimity, Beauty, Congruity, Imitation, Wit and Novelty; which were formerly called *reflex senses*. To the study of the two first-named qualities, sublimity, and beauty, the Germans have applied the term, *Æsthetics;* derived from a Greek word signifying perception.

Sublimity, is that property, either in natural objects, or in works of art, by which they seem to expand, or elevate, and solemnize the mind. Large objects, or lofty, or boundless, or obscure; as a mountain, the ocean, the sky, or darkness, frequently inspire sublime emotions. Mighty force, or motion, as the rolling of a torrent;—loud or heavy sounds, as of thunder or battles;—and whatever is a source of awe or mystery, are also sources of the sublime. Another source, is *Moral Sublimity*, arising from daring, heroic, or magnanimous actions; and also from dignity, or elevation of character. Examples of this may be found in the fabled self-immolation of Marcus Curtius, in the yawning gulf at Rome; and the real devotion of the early and the later Christian martyrs. The term *grandeur*, literally signifies greatness; but it often implies the idea of sublimity.

Beauty, is that property, by which objects attract and please the mind; exciting a gentle emotion. It was originally applied to form, texture, and color, or objects of sight: but afterwards extended to graceful motion; and also to *Moral Beauty*, arising from benevolent, affectionate, or devoted conduct. Some writers consider uniformity, amidst variety, as the essence of beauty; and Hogarth resolves beauty of form, or motion, into the undulating or waving line, which he termed the curve of beauty. The curling of smoke, the bending of tall grass in the breeze, and the mazy figures of the dance, are instances of beautiful motion; and the friendship of Damon and Pythias is a striking example of the beautiful in morals. *Gracefulness*, we consider allied to beauty, as dignity is to sublimity; the highest degree of both belonging only to the pure and the noble, in heart and in conduct.

Congruity, or suitableness of parts, and conformity of design, is also a source of beauty; but so far distinct, we think, as to deserve a separate consideration. The same may be said of *Imitation*, or the forming of resemblances to some object or production; an exercise which is a fertile source of pleasure. *Novelty*, as a source of intellectual enjoyment, comes also within the precincts of taste; and if it violate no principle, while enlarging the boundaries of art, it is doubtless a positive merit. *Wit* belongs chiefly to isolated ideas, when they surprise or amuse us, by some unanticipated resemblance or contrast: and *humor*, is the same quality, more gently and equably developed. *Ridicule*, is the application of wit, to objects of censure and satire;—an application which is sometimes useful, but often abused.

§ 4. The *Objects of Composition*, are to amuse, inform, instruct, convince, or persuade the reader or hearer. All the peculiarities of poetical, romantic, epistolary, historical, philosophical, or oratorical composition, respectively, may therefore be discussed under this topic.

Amusement, is the lightest object of composition; though the chief one of many poets and novelists; who aim to select attractive, or diverting subjects, and to treat them in an easy and elegant style. It is not unworthy of the attention of the wise and the good, in order to render their works more popular; but they will avoid recourse to any themes, or thoughts, which might corrupt, or mislead their readers or hearers. *Information*, is a somewhat graver object, and one which belongs especially to the historian; though often applied also in works of fiction. The *narrative* form of composition employed for this purpose, requires a perspicuous style; which is still farther improved by energy and elegance. The *didactic* form differs from narration, in being addressed to the reasoning, as well as to the perceptive powers; and combining arguments, with facts. Didactic composition, while it is equally perspicuous, should be more energetic, than that which is merely descriptive.

Conviction, is a still higher and more difficult object; as it aims to influence the opinions of those who are either indifferent, or prejudiced against us. It is most frequently attempted in the legislative hall; on the political rostrum; at the judicial bar; or in the sacred desk. It requires all the good qualities of style; and especially, skill in inventing and arranging arguments; which Dr. Whately regards as the chief province of Rhetoric. This last, was the object of the *Loci*, or Topics, of the ancients; which often degenerated into mere formalities. Arguments should be arranged distinctly, and somewhat in the order of a climax: beginning with strong ones, but reserving the strongest for the last. *Persuasion*, the last and highest object of composition, aims to excite the feelings; and to rouse the hearer to immediate action. Such was the eloquence of Demosthenes, and Cicero; of Samuel Adams, and Patrick Henry. It admits of the boldest figurative language, and of appeals to every allowable passion; which the orator must feel himself, or he will in vain endeavour to excite the feelings of others. *Exhortation*, intended for a permanent, rather than transient effect, should generally proceed in climatic form; not too much prolonged, nor closed too abruptly.

§ 5. The *Management of a Discourse*, presupposes that a suitable subject is chosen, and that the writer is supplied with ideas or materials for composition; to the arrangement of which this topic principally relates. The great rule here concerned, is, that every Composition should have the requisite degree of *Unity*, to give it interest; and accordingly the Critics have treated of "the three Unities," that is, of time, place, and action, as necessary to every great work of genius. If some works of genius have succeeded, though wanting in Unity, it has not been in consequence of this deficiency, but in despite of it; because it was more than counterbalanced, by other merits. The parts of a regular discourse, are, the Introduction; the Statement; the Explication; the Argument; the Excitation; and the Conclusion:—not all of which, however, are always required, to make the discourse complete.

In the *Introduction*, Exordium, or Proem, the writer aims to interest his readers in the subject, and to secure their favourable attention. It should therefore be easy and natural; modest withal; and generally dispassionate. It may contain some preliminary information, or allusions to the subject; but without too far anticipating the main parts, which are to follow. In the *Statement*, Proposition, or Division of the subject, the writer should state more fully the object in view; what he proposes to do, to prove, or to disprove. It should be perspicuous and methodical; and so divided as to exhaust the subject without repetition. In the *Explication*, or Evidence, should be introduced the facts, or data, from which the conclusions are to be drawn; whether resting on narration, quotation, or direct testimony.

In the *Argument*, whether Confirmation or Refutation, should be given the conclusions deduced, and the reasons for them; the object being to convince the hearer that these conclusions are correct; an object already referred to, under the topic of Conviction. In the *Excitation*, Exhortation, or Pathetic part, if such be introduced, the speaker aims to rouse his audience to action; often by exciting their feelings or passions. This part should be introduced opportunely, when it is required; and treated as already mentioned, under the topic of Persuasion. In the *Conclusion*, or Peroration, the speaker should take leave of his subject, and of his audience; implicitly at least, if not in a formal manner. He may here sum up his results, if addressing their reason, or make the appeal personal, if his object is to induce immediate action. Such are the general rules for the management of a discourse; but they are subject to various modifications, as time, place, and circumstances may require.

§ 6. The *Principles of Elocution*, or Delivery, may be comprehended under two heads, Enunciation, and Gesticulation. Public speaking generally requires them both; but in mere reading, gestures are for the most part superfluous, at least among our own countrymen; though the enunciation should, we think, be essentially the same in both cases.

Enunciation, is the pronouncing of a discourse: and it requires not only that the words should be correctly spoken, but with the appropriate modulations, or pauses and tones, of the voice. *Pauses* we may here add, are of two kinds; *punctuative*, serving to fix the sense; and *emphatic*, giving time to comprehend and impress the ideas. Of accent, emphasis, and cadence, we have already spoken, in treating of Orthoepy; (p. 44); but there are other modulations and tones which are essential to good reading or speaking. In general, when the sense of a phrase, or clause, depends immediately on the following one, this fact should be indicated by a rising inflexion, or tone, of the voice; but when the sense is complete, although some other idea is to be added, it should be marked by a falling inflexion or cadence. The enunciation should always be distinct, and forcible; with a due inhalation of breath at the pauses, and a constant regard to the sense.

Gesticulation, includes all postures and motions, of the body or limbs, designed to give effect to the enunciation. The posture should be firm and steady; the head elevated; and the eyes directed, generally, to the farther part of the audience; that the voice may reach them also; for the voice will naturally be adjusted to the hearing of those whom the speaker is particularly regarding. The expression of the eye, beaming with intelligence and kindness, may exert a powerful influence, which the best speakers well know how to appreciate. The gestures of the hands and arms should be free and graceful, animated and energetic; corresponding to the sense; and rather preceding, than following, the expression of the idea which they enforce. Finally, the great rule of Oratory, is to follow and cultivate nature; recollecting that the greatest art is displayed, when all appearance of art is concealed.

CHAPTER II.

LOGIC.

Logic, is that branch of knowledge which investigates the process of Reasoning, and deduces rules for its guidance. The name is from the Greek λογικη, of the same meaning; and this from λογος, which may signify *reason*, as well as discourse. Logic is often defined "the Art of Reasoning;" but in analyzing the process by which correct conclusions are obtained, it equally merits the title of a Science. The term Logic, in former times, was used in a much wider sense, to include various subjects on which the reasoning powers were employed: but this, as in the case of Rhetoric, is confounding the process with the materials on which it operates. The study of Logic, aids us in forming correct conclusions; in detecting sophistry, fallacies, or false reasoning; and in rectifying our own errors, as well as those of others.

Zeno, of Elea, hence called the Eleatic, is the reputed inventor of Logic, or rather of the art of disputation and sophistry; and Euclid, of Megara, a pupil of Socrates, and the founder of the Eristic school, is said to have invented many fallacies, or specimens of false reasoning. To Archytas, of Tarentum, are attributed the *ten Categories* of the ancients; (topics under which all ideas may be classed); viz. *substance*, *quantity*, *quality*, *relation*, *action*, *passion*, *time*, *place*, *situation*, and *habit*. But the true inventor of Logic, was *Aristotle;* who first investigated the process of correct reasoning, in a satisfactory and scientific manner. His writings, after being lost for a time, were afterwards found; and in the fifth century they were translated into Latin, by Boethius. His system was widely perverted by the schoolmen of later times; who, among other things, pretended to investigate the laws of the material world, by mere logical, or rather metaphysical speculations.

These errors were broadly exposed and counteracted by Lord Bacon; who unfolded more fully the method of *induction*, or of deriving conclusions from facts and experiments, instead of speculations. As the schoolmen had styled Aristotle's treatise on Logic, *Organon*, or the great instrument of reasoning; Bacon styled his work *Novum Organum*, or the new instrument: and this work is believed by many learned men, though not by all, to have contributed greatly towards the unprecedented advancement of the exact sciences, in modern times. Dr. Watts has since written a valuable work, on *The Right Use of Reason;* but the best treatise on this subject, is doubtless that of Archbishop Whately, originally published with his Rhetoric, in the Encyclopædia Metropolitana.

We proceed to give some farther ideas of Logic, under the heads of Terms and Conception; Propositions and Judgment; Syllogisms and Reasoning; Fallacies or Sophisms; Grounds of Judgment; and Uses of Reason.

§ 1. A *Term*, in Logic, is a word or phrase, serving to express a single idea, whether simple or complex; as a man, a good library. An *idea*, we can only define as an object or subject of thought. The act of the mind, by which the idea is present, or presented, is called *Conception;* or, by Dr. Whately, Simple-apprehension. Terms, being words, are arbitrary signs of ideas, and hence liable to be indistinct. The first great step in reasoning, therefore, is to have distinct and exact ideas, corresponding to the terms which we employ ourselves, or receive from others.

A *simple term*, as understood by logicians, consists of one or more words conveying a simple idea; as, the book: but a *complex* term, is one which expresses a complex idea; as, that good, old man. An *absolute* term, is one which has no necessary relation, or reference, to any other: but a *relative* term, implies some relation, or has some reference; as father, and son; which may be called *correlative* terms. An *abstract* term, expresses merely a quality or contingent; as roundness, whiteness: but a *concrete* term, also expresses substance; as, a man; a book. A singular, or *monental* term, expresses but one object; as George Washington: but a common, or *universal* term, expresses a whole class, genus, or species of objects; as man, tree. A term expressing a class of objects, may comprehend several genera; and one expressing a genus, may include many species; each of which may include several varieties; and each of these may comprehend numerous individuals.

Privative, or negative terms, are such as express the want of a quality, or absence of an object: as dumbness, nonentity. *Compatible* terms, are such as express qualities, contingents, or relations, that are consistent, or may exist together. *Univocal* terms, are those which have always one and the same meaning; while *equivocal*, or ambiguous terms, have more significations than one. *Analogous* terms are such as have similar meanings; and *synonymous* terms are such as have the same meaning; as omnipotent and almighty; omniscient, and all-knowing. *Definitions* of terms, are *real*, when they describe the object, or its properties; but *nominal*, when they explain the term merely by using its synonyms: as when a billow is defined to be a wave. A universal term is said to be *distributed*, when applied in its widest sense, to include every individual which it comprehends.

§ 2. A *Proposition*, is an expression in which something is *predicated*, that is affirmed or denied; as, John is good; horses can run. It is the result of a Comparison, or *Judgment*, expressed in words; and it necessarily consists of two terms, expressed or implied, one of which is called the *subject* and the other the *predicate;* these being united by a *copula*, which is often some form of the verb *to be*. In the first example above given, *John* is the subject; *good*, the predicate; and *is*, is the copula. The second example above, is irregular, but signifies, horses are capable of running; in which form, *capable of running* is the predicate. In a *simple* proposition, the subject and predicate are both simple terms; but in a *complex* proposition they are one or both complex. *Categorical* propositions express the result absolutely; but *hypothetical* propositions express it conditionally, or with restrictions; as, John is good, if he is temperate. In *modal* propositions, the copula or verb is qualified; as, Brutus killed Cæsar *justly*. A *compound* proposition has two or more subjects, or predicates; and may be resolved into two or more simple propositions.

As regards *quantity*, propositions are either *universal* or *particular;* and as regards their quality, or nature, they are either *affirmative* or *negative*. Hence arise four kinds of Propositions, which are designated, in Books of Logic, by the first four vowels; and named, as in the following examples.

A. Every war is just. *Universal Affirmative.*
E. Every war is unjust. *Universal Negative.*
I. Some wars are just. *Particular Affirmative.*
O. Some wars are unjust. *Particular Negative.*

Referring to these forms, when compared together, A and E are termed *Contraries:* I and O, *Subcontraries:* A and O, or I and E, *Contradictories;* and A and I, or E and O, are termed *Subalterns*. From this, it will be seen, that two Contraries cannot both be true, though they may both be false; two Subcontraries may both be true, but not both false; two Contradictories cannot both be true, nor yet both false; and of two Subalterns, the particular is true if the universal is, but the particular may be true, and the universal false. In the *Conversion* of a proposition, or making the subject and predicate change places, care must be taken to restrict the terms to their first or original meaning.

§ 3. A *Syllogism*, is an argument, stated, as every argument may be, in a regular Logical form; as, All tyrants deserve death: Cæsar was a tyrant; therefore he deserved death. An *argument*, technically defined, is a process of *Reasoning*, or of inference, in which something is concluded or proved, by the comparison of certain conditions or data. The use of a syllogism, is to test the correctness of an argument, in difficult or doubtful cases; in which, though often contemned, it is an instrument of real importance. It should be observed, however, that not only must the process of reasoning be legitimate, but the data, to which it is applied, must also be correct, in order to insure a correct conclusion. Every syllogism consists of three propositions, expressed or implied; two of which are given, and called the *premises*, or data; while the third, which, before being proved, was called the *question*, becomes, when proved, the *conclusion* or inference. A syllogism necessarily contains only three terms; each being twice employed. In the example,

$$\left\{\begin{array}{l}\text{Every plant is combustible:}\\ \text{Every tree is a plant;}\end{array}\right\}\ \textit{Premises.}$$
Therefore, every tree is combustible.

Plant is the *middle* term, because found in both the premises; *tree* is the *minor* term, found in the second or minor premiss; and *combustible* is the *major* term, which is always the predicate of the conclusion. If one of the premises be negative, the conclusion, if there be any, must be negative also.

The *figure* of a syllogism, has reference to the place of the middle term; and the *mood* depends upon the kinds of propositions, among the four kinds above tabulated, which are employed. In the following verses, all the allowable moods are indicated by means of *mnemonical words;* the kind of propositions used, being designated by the vowels in the name; as explained in the preceding section.

Fig. 1. *Barbara*, *Celarent*, *Darii*, *Ferio*-que prioris;
Fig. 2. *Cesare*, *Camestres*, *Festino*, *Baroko*, secundæ:
Fig. 3. Tertia *Darapti*, *Disamis*, *Datisi*, *Felapton*,
Bokardo, *Feriso*, habet: quarta insuper addit.
Fig. 4. *Bramantip*, *Camenes*, *Dimaris*, *Fesapo*, *Fresison*

The example last given, concerning trees and plants, is in the mood *Barbara;* all three of its propositions being universal and affirmative; universal as regards their *quantity*, and affirmative in regard to *quality*. An *Enthymeme*, is a syllogism, abridged by suppressing one of the premises; as, every tree is a plant, and therefore combustible. An *Epichirema*, is a compound argument, in which the premises are separately proved by syllogisms, before drawing from them the final conclusion. A *Dilemma*, is a complex or conditional syllogism; in which something is proved, either as still true under varying conditions; or as conditionally true, under one of two or more alternatives. The *reductio ad impossible*, and *reductio ad absurdum*, consist in proving something, by showing that the contrary would involve either an impossibility or an absurdity. A *Sorites*, is a series of abridged syllogisms, from which a final conclusion is derived.

§ 4. A *Fallacy*, or Sophism, is a false argument; or else an argument leading to a false conclusion. The use of such arguments is sometimes called *sophistry;* and in complex cases, it may be very difficult to detect. When the premises are false, or unsupported, or irrelevant, the fallacy is called *material;* but when the error is in the process of employing them, the fallacy is called *logical*.

Of material fallacies, the *petitio principii*, or begging of the question, consists in assuming that what is to be proved, is true, merely by stating it in another form: as when it is said that miracles are impossible; for nothing contrary to the course of nature can possibly take place. Here is assertion, and assumption; but no proof. The *elenchus in orbe*, or arguing in a circle, is where one thing is proved by assuming a second to be true; and this second is then seemingly proved by the aid of the first. The *ignorantia elenchi*, or ignorance of the question, is where the arguments, whether true or false, do not strictly apply to it. All irrelevant matter, such as a personal allusion, or an *argumentum ad hominem*, comes under this class. The fallacy of *equivocation*, consists in using the same term in two different senses: as if we should say, light is opposed to darkness: but feathers are light; therefore feathers are opposed to darkness. Here the fallacy is evident, and the conclusion absurd; but there are other cases, where the conclusion may be plausible, and the fallacy very difficult of detection; especially in the midst of a sorites or protracted argumentation.

The fallacy of *composition*, assumes that to be true generally, which is only so in a restricted sense. The reverse of this, or fallacy of *division*, assumes that to be true, in a particular case, which is not so in that case, though it may be in similar ones. The fallacy of *accidents*, or *fallacia accidentis*, consists in deriving general conclusions from data which are only accidentally or temporarily true. Lord Bacon, in his Novum Organum, arranged the various sources of error in opinion, under four heads; which he fancifully called, *idola tribus*, or general errors of parties and sects; *idola specus*, or peculiar errors of individuals; *idola fori*, or errors of language and conception; and *idola theatri*, or errors of perception and speculation.

§ 5. Under the head of *Grounds of Judgment*, we would treat of the evidence, or proof, on which our premises rest; and the degree of weight, or credence, to be given to them. Premises, we have said, are results of judgment; and a *judgment* we would define to be an act of the mind, by which it perceives the correspondence, or the disagreement of two ideas. The ground, or basis, on which a judgment rests, is called *Evidence;* which may be either personal or historical, factive or deductive. *Personal* evidence, is that afforded by our own senses or reasoning powers; being the result of consciousness, or perception; or at least founded thereon; as in experiments, observations, and axioms, which we perceive, feel, or recognise to be true. *Historical* evidence, is that which we have on the authority of others, as the testimony of witnesses, and the statements of writers. *Factive* evidence is that which rests immediately on perception or consciousness, or on the memory of past perception or consciousness; while *deductive* evidence is that which is deduced from factive, by some process of reasoning; and which is used for premises in deriving farther conclusions.

As regards its degree of certainty, evidence is either *indubitable* or *probable.* Demonstrative evidence, such as is employed in the exact sciences, resting on definitions or axioms, is usually considered indubitable; and distinguished as *mathematical certainty.* Perceptive evidence, derived from experiments or observations, ranks nearly as high, and is termed *physical certainty.* Historical evidence, strongly corroborated, is next to indubitable, and is characterized as *moral certainty.* Analogical, or inductive evidence, founded on the presumption of similar effects from similar causes, or of like conditions from like circumstances, has various degrees of probability, in different cases, and requires to be carefully weighed. Such evidence, admits, in some cases, of mathematical valuation; and some estimate of its value we are often compelled to make, in the ordinary concerns of life. The *Calculus of probabilities*, in which such valuation is most accurately made, belongs to the department of Mathematics; and is the basis of life insurance, and other important operations.

§ 6. The *Uses of Reason* are not confined to the deriving of conclusions, nor even to the verification of premises: but they extend also to the *invention of new premises*, or the discovery of new truths; and to the methods of prosecuting such discoveries. New truths are most frequently suggested to the mind, by *analogy*, or by *induction.* Thus, when it became known that lead was fusible, it was suggested by analogy that other metals might also be melted; and when this was found to be the case with all the metals then known, it was concluded, by induction, that all metals have the property of being fusible; as later discoveries have farther indicated. We can only add, that analogy and induction should not be trusted too far, without experimental verifications.

There are two opposite methods of employing our reasoning powers; the analytic and synthetic. In the *analytic* method, we resolve a complex subject into its simple elements; or trace effects back to their causes; while in the *synthetic* method, we recombine the elements to reproduce the complex result; or follow out the causes, to discover the effects which they may produce. Each method has its advantages; and each serves to corroborate the conclusions obtained from the other. The analytic method is the most useful in discovering new truths; but is generally more abstract and intricate. Hence the synthetic method is frequently used for instruction, or demonstration; and it serves to explain the relations of cause and effect, in a more natural order. In all arguments, or controversies, care should be taken to fix and define the exact meaning of the terms employed; for many disputes are *verbal*, and not *real;* arising solely from different ideas being attached to the same word or term. Another important rule of controversy, is, that we should avoid all personal reflections upon an adversary; particularly where abstract truth is the object of the argument.

CHAPTER III.

PHRENICS.

We would apply the term Phrenics, to *Mental Philosophy;* or to that branch of knowledge, which treats of the faculties of the human mind, and their laws of action; with a general reference to their use and cultivation. The early improvement of the mind depends upon the laws of Phrenics; but is made a special study under the branch of Education. The name Phrenics, is from the Greek φρην, the mind; from which is also derived the term *Phrenology*, a term now appropriated to a particular scheme, or system, of Mental Philosophy. The terms *Metaphysics*, and *Pneumatology*, have also been applied to this branch; but of their impropriety we have already spoken. (p. 36). Much as this study has been obscured by conflicting systems, it is one of practical utility; especially as introductory to Ethics, and Education.

Although the nature, or essence of the mind is unknown to us; we know that its actions, or manifestations, consist of either *thought* or *feeling;* and that all thought is composed of *ideas;* which may be defined objects or simple elements of thought. We know the existence of the mind, as distinct from matter, by our own consciousness; by analogical reasoning; and by the evidence of the Scriptures. We have like strong reasons for believing the mind, or soul, to be immortal, and imperishable; although the mortal body, which connected it with the material world, after having performed its task, shall be laid aside. "Although the scaffolding of the senses should be thrown down:" the edifice will be complete; the object for which the senses were given will have been attained; "and no argument against the soul's immortality can be deduced from their decay."

Aristotle supposed ideas to be images, or *phantasms;* resembling their original objects, but conveyed to, and existing in, the mind. Hence the doctrine of the Schoolmen, that "nothing exists in the mind, which was not first perceived by the senses." Descartes, on the contrary, maintained the doctrine of *innate ideas:* that is, of certain impressions or principles, coexistent with the mind, or at least independent of the senses. Locke rejected this doctrine also; but he admitted that the mind may derive ideas, by reflecting on its own operations, as well as by means of the senses. Hobbes, prior to Locke, had proposed a *material theory* of the mind; attributing all thought to certain sensations, or motions, of the body. This probably led Berkeley to promulge his *ideal theory;* maintaining that what are called sensible, material objects, are not external, but exist only in the mind. Thus, while Hobbes denied the existence of the mind, Berkeley went to the opposite extreme of denying the existence of matter.

Hume was so sceptical as to deny that we can know any thing certainly, or even that there is any necessary connection between cause and effect; while Kant, on the other hand, maintained not only the existence of this connection, but that our knowledge of it is spontaneous or intuitive. Dr. Reid also maintained the existence of certain ideas, which cannot be derived from the senses; as the perception of right and wrong, or the *moral sense.* Stewart modified this theory, by admitting that sensible objects first occasion the use of our faculties; though he maintained that the mind can afterwards operate upon the ideas or materials derived from perception: and this view of the subject we are inclined to adopt. Dr. Brown and others have endeavored to show how we may trace the connection of ideas, by the laws of suggestion or association: laws which are well worthy of attention, so far as they can be proved to exist.

The doctrine of *Phrenology*, proposed by Dr. Gall, as early as 1798, and improved by Dr. Spurzheim, considers the mind as possessed of certain faculties, or influenced by certain affections; each of which is connected with a certain portion of the brain, as its seat, or organ; on the developement of which, its strength and activity depend. This theory does not controvert the unity of the mind, as a spiritual and responsible agent; but attempts to explain its phenomena more fully than the older systems. We are not prepared to adopt it in full; still less to disprove it;—but we think that its introduction has been of benefit to this branch of knowledge; particularly in improving the classification of the mental powers.*

We proceed to treat of Phrenics, under the four heads of Propensities; Sentiments; Perceptive Powers; and Reflective Powers;—the two former comprising the *affections;* the two latter, the *intellect*, or *reason*.

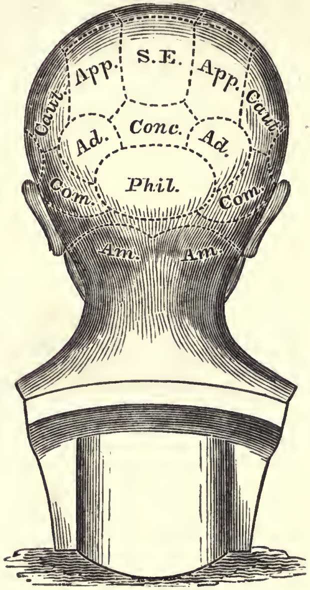
* The positions and names of the cerebral organs, are given in Plate III.; according to the latest Boston edition of Combe's Phrenology.

§ 1. Under the head of *Propensities*, we here include those appetites, and instincts, by which man is influenced, in common with the lower animals; most of them having the preservation of the individual, or that of the species, for their object, or final cause. Though capable of suggesting thoughts, they more commonly excite desires, irrespective of the reasoning powers. Among them the Phrenologists include *Alimentiveness*, or the desire of food and drink; and *Amativeness*, or the attachment of the sexes; these being termed the animal appetites: also *Philoprogenitiveness*, or fondness for children; *Concentrativeness*, or an instinct to perseverance, and concentration of thought; *Adhesiveness*, or attachment to persons and places; *Combativeness*, or an impulse to repel aggressions, and when excessive, an impulse to attack others; *Destructiveness*, or an impulse to kill or destroy, belonging chiefly to carnivorous animals; *Secretiveness*, or an impulse to conceal; *Acquisitiveness*, or an impulse to acquire and possess; and *Constructiveness*, or an impulse to build and fabricate.

All these propensities, it may be observed, belong to other orders of animals, as well as to the human race. Granting their existence, as elementary principles, by which the mind is more or less influenced,—whether connected with particular organs of the brain, or not,—we think that *Imitativeness*, or an impulse to imitate persons and things; and perhaps *Cautiousness*, if it be a distinct affection, should be placed in the same class. Each of these propensities, may produce a *desire*, which, when violent, is termed a *passion:* and these passions, it is the province of reason to direct and control; lest they should prove impulses to destruction, rather than to preservation. *Emotions*, which differ from passions, in being unaccompanied by desire, may also result from these propensities; but they more commonly belong to the next class of mental affections.

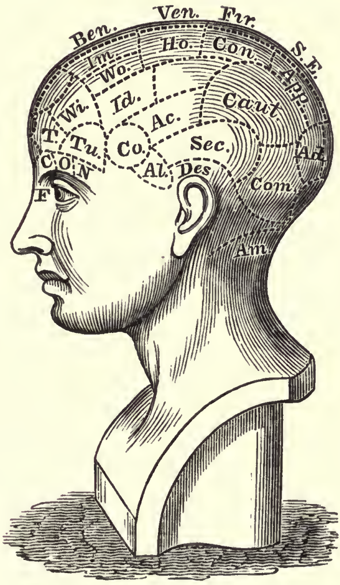
§ 2. The *Sentiments*, so called, are a higher class of feelings; generally excited or called forth by the perceptive powers, though afterwards capable of acting reflectively. We call them *feelings;* conceiving that they are to the mind, what sensation is to the body. Their use, like that of the propensities, seems to consist in prompting men to action, where reason might fail; and rewarding right conduct with mental enjoyment; through the wise provision of our beneficent Creator. These sentiments are so similar to some of the propensities before mentioned, that we think the line of distinction between them somewhat doubtful and arbitrary. They may be classed as either moral or intellectual. Of *Moral Sentiments*, Phrenologists enumerate *Self-esteem*, or a sense of personal merit and importance; *Approbativeness*, or a desire for the esteem of others; *Cautiousness*, which we have already mentioned; *Benevolence*, or the desire of good to others; *Veneration*, or the sense of dependence, and feeling of reverence; *Firmness*, or the sense of power and free agency, when excessive, leading to obstinacy; *Conscientiousness*, sense of duty, or the Moral Sense; and *Hope*, or inclination to expect some future good. Of *Intellectual Sentiments*, the Phrenologists enumerate *Wonder*, or rather Curiosity, by which the mind is impressed with things new or remarkable; *Ideality*, or a sense of the beautiful, and

PLATE III. PHRENOLOGY.



ORGANS.

* *Al.* Alimentiveness.
1. *Am.* Amativeness.
2. *Phil.* Philoprogenitiveness.
3. *Conc.* Concentrativeness.
4. *Ad.* Adhesiveness.
5. *Com.* Combativeness.
6. *Des.* Destructiveness.
7. *Sec.* Secretiveness.
8. *Ac.* Acquisitiveness.
9. *Co.* Constructiveness.
10. *S. E.* Self Esteem.
11. *App.* Love of Approbation.
12. *Caut.* Cautiousness.
13. *Ben.* Benevolence.
14. *Ven.* Veneration.
15. *Fir.* Firmness.
16. *Con.* Conscientiousness.
17. *Ho.* Hope.
18. *Wo.* Wonder.
19. *Id.* Ideality.
20. *Wi.* Wit.
21. *Im.* Imitation.
22. *In.* Individuality.
23. *F.* Form. — 24. *S.* Size.
25. *W.* Weight.
26. *C.* Coloring.
27. *Lo.* Locality.
28. *N.* Number.
29. *O.* Order.
30. *Ev.* Eventuality.
31. *T.* Time. — 32. *Tu* Tune.
33. *L.* Language.
34. *Comp.* Comparison.
35. *Caus.* Causality.



Engraved by R. S. Gilbert, Phila.

perhaps also of the sublime; *Wit*, or a sense of the ludicrous; and *Imitation*, of which we have already spoken.

To these simple or primitive *sentiments*, in connection with the propensities and reasoning powers, and with the influence of external causes, we think all other sentiments, so called, may be traced. Thus, Energy and Cheerfulness arise from good health, uprightness, and prosperity; but Languor, and Melancholy, from ill health, and adversity, or sometimes from vicious conduct. Joy and Sorrow, Gratification and Regret, Pleasure and Pain, are produced by various causes, physical, intellectual, or moral; their nature and intensity varying with the cause. Sympathy, Friendship, and Love, arise from benevolence, adhesiveness, or personal congruities; but Antipathy, or Dislike, and Hatred, from personal incongruities, with excessive combativeness, or want of benevolence. Anger, results from personal injuries; and Gratitude, from personal favours. Pride is an excess, and Humility, a deficiency, of self-esteem; the latter conjoined perhaps with veneration. Vanity is an excessive manifestation of approbativeness; Misanthropy, a want of benevolence; Remorse, a reflective action of conscientiousness; and Despair, is the absence or inactivity of hope, in depressing circumstances. It may be doubted whether *Moral Approbation*, or the "sympathetic emotion of virtue" should be reckoned as a primitive sentiment, or as one derived from conscientiousness. The distinction, given by Lord Kames, between *emotions*, and *passions*, is, that the latter excite desire; while the former do not: but both these results, we think, may belong to the same sentiment, at different times or stages.

§ 3. The *Perceptive Powers*, are those which enable us to form ideas of external objects, through the medium of the senses; that is, by means of sensation. *Sensation* is an effect produced by material objects upon the organs of sense, and by them, through the nervous system and the brain, upon the mind; causing that mental operation which is called *Perception*. The different modes of sensation, are the *five senses;* Seeing, Hearing, Smelling, Tasting, and Feeling. By these we derive the simple ideas of Color, Form, Size, Tone or Sound, Smell, Taste, Weight or Resistance, Temperature, and Physical Pleasure or Pain. Dr. Darwin regarded the sensations of *heat* and of *pain* as primitive; ranking them with the five senses above named. The ideas of Number, Order, Time, Motion, Action or Eventuality, and Position or Locality, we regard as complex, and dependent in part on the reasoning powers. Ideas of shape, and size, may be acquired either by seeing, or feeling; but ideas of color, sound, smell, taste, and resistance, can only be acquired each by a single mode of sensation.

The enumeration of simple and of complex ideas above given, differs somewhat from the assignment of organs by the Phrenologists, and is offered with diffidence, though derived from high authorities. (Plate III). We may here add, that the senses cannot always be implicitly depended upon; even when the most acute. The eye is often deceived, in the distance of objects, and the ear, in the direction of sounds. We may sometimes imagine that we see or hear, when influenced only by mental excitement; or on the other hand, our organs of sense may receive impressions, and the mind remain insensible to them, from inactivity or pre-engagement. Hence the importance of *Attention*, to insure correct perceptions. The *eye* and the *ear*, or the senses of seeing and hearing, are the sources of nearly all those ideas which are connected with the *Fine Arts;* and from which the Intellectual sentiments are chiefly derived. Hence, they are the senses chiefly concerned in the cultivation of *taste;* though subordinate to the intellectual powers. Wonderful is the adaptation of our senses to the world in which we live. Were the whole body as sensible to light as the eye, or to sound as the ear, we should be in continual torture; and were the eye and ear less sensible to these agents, they would no longer serve their purpose, to put the mind in communication with the external world. This admirable harmony of our being, is one among many proofs of the existence and benevolence of the Deity.

§ 4. The *Reflective Powers*, of which we are lastly to treat, are the highest class of intellectual powers; by the action of which, all the others are, or should be regulated. They are developed later than most of the preceding powers; on which they are primarily dependent for ideas and motives. Ideas being once acquired by *Perception*, may be recalled by *Memory*, prompted by their previous relations; and may be variously modified or combined by the *Imagination* or Fancy. Memory, and Imagination, have been termed reflex perception; and though not reasoning powers, they are mental exercises auxiliary to them, as furnishing the materials on which these are employed. That cognisance which the mind takes of its own operations may be called internal perception, or reflection; and this likewise, furnishes materials for reasoning. *Habit*, or the formation of habits, we regard as depending on Memory, and the Will, influenced by the Association of ideas. The writers on Phrenology, rank *Language* with the perceptive powers; but it seems to us to belong rather to the reflective powers, and is be intimately connected with the Association of ideas; which we regard as the basis of all reasoning.

The process of reasoning, including Conception, Comparison, and Inference or Causality, has already been alluded to, under the branch of Logic. By *Conception*, we recall ideas, not necessarily as matters of feeling or fact, but simply as objects of thought: by the faculty of *Individuality*, we consider several ideas belonging to a complex object, as a whole, or generalize them: and by *Abstraction*, we consider the simple or component ideas separately, or analyze them. By *Comparison*, we examine two ideas in connection, and form a Judgment; and by *Inference* or *Causality*, we combine two or more judgments or propositions, to deduce a Conclusion; or we seek a cause of some effect, or an effect of some cause. *Analogy*, and *Induction*, or rather analogical and inductive reasoning, which we have referred to, under Logic, may, we think, be considered as distinct processes, if not distinct mental powers.

In describing the mental powers, we must carefully guard against the idea that these powers collectively constitute the mind; as an assemblage of Senators may compose a Senate. They are to be regarded only as affections or faculties, with which the soul is endowed; and for the right use of which, it will be held responsible, by its Creator. It remains to speak of the *Will*, or *Volition;* which we conceive to be the final decision of the mind; or if regarded as a mental power, it is the power to act, sometimes called the power of *agency*. Our actions depend on our thoughts; and these are influenced not only by passing events, but by their own *associations*,—previously existing,—from resemblance, proximity, contrast, or other causes; whereby one idea *suggests* another, often involuntarily. Hence the great importance of correct associations of ideas, to prompt the memory, and aid the reason. That the Will is so often opposed to reason; and reason itself enfeebled by the affections; clearly evinces a fall, or deterioration, from the primeval perfection of our nature.

CHAPTER IV.

ETHICS.

Ethics, or *Moral Philosophy*, is that branch of knowledge which treats of our duties, to ourselves, to our fellow-men, and to our Maker; and the reasons by which those duties are enforced. Its name is from the Greek ηθος, morals: and it is also termed *Morality*, *Casuistry*, or the study of *Natural* or *Moral Law:* but we think that Morality refers rather to the performance of duty, than to the study of it; and that the term Casuistry is the least appropriate of them all. The great object of Ethics, is to promote the cause of virtue; by showing its reasonableness, its excellence, and beauty; and the melancholy consequences of neglecting or forsaking it. *Virtue*, consists in the performance of our duty, from a sense of obligation; and *Vice*, is the neglect or violation of our duty, where it should reasonably be known: for to learn what is our duty, is one part of that duty itself.

Socrates comprehended all virtue under two heads; *temperance*, or the duty which man owes to himself: and *justice*, or that which he owes to his fellow-men. The obligation to virtue he derived from the will of the Supreme Being. Zeno the stoic, and Seneca, of the stoic school in philosophy, adopted the same views. Plato, copying Pythagoras, enumerated four *cardinal virtues*, temperance, prudence, fortitude, and justice, which have since been called *philosophical* virtues; while faith, hope, and charity, have been termed *Christian* virtues; though Christianity includes them all. Modern writers have differed much concerning the obligation, or foundation, of virtue. Hobbes places it in political enactment; Mandeville, in the love of praise; Dr. Clarke, in the fitness of things; Adam Smith, in sympathy for our race; Grotius, and Puffendorf, in the duty of improvement; Hume and Paley, in personal utility; while Hutcheson, Cudworth, Butler, Reid, Stewart, and others, derive it from a Moral Sense, or natural impulse to do right, implanted by our Creator.

Of course, the obligation of virtue rests ultimately on the will of God; and is a consequence of the Divine Perfection: but we fully believe in a *Moral Sense*, or sentiment of Conscientiousness, implanted by our Creator, to incline us to do what we know to be our duty. *Conscience*, we believe to be this principle, guided by reason, and acting retrospectively, by the aid of memory. Both conscientiousness, and reason, are, however, liable to be enfeebled and perverted; and hence the necessity for a higher incentive to duty, in the sanction of religion, enforced by Divine Revelation. Dr. Paley, considering private happiness as our motive to virtue, and rejecting the doctrine of a Moral Sense, founds our inducement to virtue on selfish principles, of mere reason, and personal benefit. While we admit that such principles often govern the actions of men, we think that the gratification of the Moral Sense, in the consciousness of virtuous conduct, is a high and peculiar inducement to virtue, independent of all reasoning: and that a feeling of this kind was necessary, in order to counterbalance other feelings; which without this, would more frequently lead us astray. Thus, by a wise Providence, the duties enjoined upon us, in our present state, are made to contribute to our happiness: while the crimes forbidden by virtue and religion, are such as, if generally allowed, would soon spread misery and destruction among mankind.

We proceed to treat of Ethics, under the four heads of Personal, Cognate, Social, and Religious Duties; the last, strictly speaking, including, and sanctioning all the others.

§ 1. *Personal duties*, are those which relate especially to, or which we owe immediately to ourselves. They all refer to Self-preservation, the first law of nature: or to Self-improvement, which is of no less importance. The first three of the cardinal virtues, temperance, prudence, and fortitude, are a part, but only a part, of the virtues which come under this head. *Temperance*, includes the control and regulation of all our propensities and sentiments. It comprehends therefore *sobriety*, and all its kindred virtues. The opposite vices are gluttony, drunkenness, impurity, covetousness, anger, and the like; the indulgence of which is a voluntary sacrifice of life, health, and happiness, for a false and momentary enjoyment. *Prudence*, in avoiding useless risk or danger; and *Fortitude*, in opposing or confronting danger, when unavoidable, are also duties which we owe chiefly to our own happiness. *Patience* in enduring pain or disappointment, is often confounded with fortitude; but is more properly its effect. *Industry* and *Economy*, are doubtless moral duties; necessary to our future comfort and support, especially in sickness and age. Sloth, and prodigality, or extravagance, are criminal therefore, even towards ourselves; however countenanced by the luxurious and the vain.

The duties of *Mental*, *Moral*, and *Religious Cultivation*, result, like the preceding, from the will of God, that we should promote our own happiness, and his honor and glory. The acquisition of knowledge, promotes our happiness, by enlarging our sphere of usefulness, and giving us more elevated views of the Creator and his works. Moral improvement, subserves the same object, besides the gratification of the moral sense; and if sought with the right motive, it is the sure avenue to higher views of our duty and our destiny. It will lead us to realize how imperfect is that *Code of Honor* which the world has formed for its own convenience; which permits the gamester, the adulterer, the drunkard, the plunderer, the swindler, the calumniator, and the duellist, though a murderer, to mingle with honorable men, unpunished and unreproached. It will also bring us to realize how far the *Civil law* falls short of defining and prescribing our moral and religious duties; for which use indeed it was never intended; having reference to our political duties only.

§ 2. By *Cognate* or *Domestic duties*, we mean those which grow out of the different family relations; and which may be classed as conjugal, parental, filial, and fraternal. *Conjugal* duties, are those which pertain to the husband, and wife, in the married state. Most of these are reciprocal; as affection, constancy, sympathy, comfort, and assistance; which the parties pledge to each other at the altar. As the wife is necessarily more or less dependent upon the husband; he is in duty bound not only to support and protect her for the present time, but also to provide for her future support, in case of his disability or death. The wife, on the other hand, is pledged to obedience; because there should be but one head to a family: but the husband who can abuse his power, tyranically, is unworthy of the name.

Parental duties, are among the most important, and responsible, which can be assumed: as, on their faithful performance, the welfare of society, and the fate of individuals greatly depends. The parent is bound not only to maintain his child, in sickness and in health, but to prepare him to become a useful member of society; to form his character, and to imbue his mind with right principles, and useful knowledge. This subject will be treated of more fully, in the branch of Education; but we may here remark that the parent who withholds the time and attention required for these objects, is answerable to God and to his conscience, for the consequences, however serious. The father should also provide for his child's comfortable establishment in life; and still advise and sympathize with him, when separated from the paternal home. *Filial duties*, are those which children owe to their parents; including affection, respect, sympathy, obedience; and assistance, as far as they have the power to render it. We might add probity, and candour; but these are alike necessary in all the domestic and social relations: for confidence, which is the soul of affection, and the key to respect and esteem, cannot exist without them. Obedience to parents, in all reasonable commands, we deem one of the cardinal duties; which should be enforced from early infancy; and which, if rightly understood, will be less a task than a pleasure. In the same class with filial duties, we would place those towards all elder Relations.

Among *Fraternal Duties*, or those relating to brothers and sisters, are affection, respect, sympathy, and assistance; the latter particularly from brothers to sisters, and from the elder to the younger. It includes watchfulness over manners and morals; and instruction as far as possible in useful and entertaining knowledge. In early age, these duties extend to the sharing of each other's labors; the preservation of each other's character; the prevention of errors; and the redress of wrongs: and in maturity, they extend to the assistance of each other, as means and opportunities are afforded, in obtaining a comfortable settlement and support.

§ 3. *Social Duties*, are those which we owe to our fellow-men, in the relations of society; or as members of the great human family. These duties may be classed as either active or passive: that is, we are to avoid doing harm, and to strive to do good, to those around us, with a view to promote both their happiness and our own. Among the *active*, or positive social duties, are those of friendship, benevolence, and patriotism; while the *passive*, or negative, may all be comprehended under the single head of justice,—as regards the persons, property, reputation, peace, and virtue of our fellow-men.

The duties of *Friendship*, are reciprocal; and closely resemble those of fraternity; including fidelity, kindness, defence against slander or wrong, and such advice or assistance as the relative situation of the parties may enable them to give. As these duties are voluntarily assumed, they should not be exacted by either party, longer than may be agreeable to the other; but neither should past favors be forgotten, nor old friends neglected; nor can a cessation of friendship justify subsequent injury, or betrayal of confidence. One of the most disagreeable traits of character, is a disposition to withdraw friendships once formed, on slight or insufficient cause. Great care should be exercised in the choice of friends; but still greater in preserving this relation, and performing its duties, when once assumed, either expressly, or by implication. The duties of *Benevolence* are not optional, but imperative on every human being. Assistance to the needy, and comfort to the distressed, whenever they can be afforded, belong to the very essence of humanity. Besides these more active duties, we owe courtesy and kindness to all persons whom we meet: as feeling the need of a like civility towards ourselves. *Gratitude*, prompting to make a due return for favors received, is a sacred duty; allied to benevolence, if it be not a simple act of justice.

Patriotism, comprehends the duties which we owe to our country; that is to our fellow-citizens collectively. Among these duties are *obedience* to the laws, and constituted authorities, so long as they accord with justice and virtue; *support* of them, and of all useful public institutions, by our quota of time and money; and *influence*, in favor of public virtue, of the best measures and the worthiest men,—through the ballot-box, or the press; by precept and by example. It is no excuse to say that we can do but little towards the election of public officers, or the founding and support of benevolent institutions, or the preservation of public morals. If we neglect our share, we not only cause a deficiency; but encourage others to do the same, and make the deficiency greater: and so far as these effects may extend, we are answerable for the consequences.

Justice to our fellow-men, in regard to their *persons*, requires that we should avoid inflicting pain, whether by wounding, maiming, contagion, contamination, or death. In regard to *property*, it requires that we should neither interfere with its lawful acquisition, nor take it from others when acquired, without just reason therefor. Hence it forbids theft, robbery, extortion, fraud, circumvention, or the withholding of just dues. It regard to *reputation*, justice forbids that we should injure it by slander, falsehood, prevarication, or even by divulging the truth, except for their own good or that of others. We should not disparage their capacity, skill, principles, or motives, without just cause; nor injure them in the affections or esteem of our fellow-men. As regards *peace*, or tranquillity, we should not disturb, or alarm them, or excite their passions, without just reason; and as regards *virtue*, we should not only avoid impairing it, where found; but even justice requires that we should manifest our displeasure at every vicious word, action, or example, that we are compelled to witness.

§ 4. *Religious Duties*, are those which we owe to the Supreme Being, the Great Author of our existence; whose will we are impelled to obey, both from a sense of obligation, and a desire of future happiness, implanted in our minds through His beneficence. These duties, we repeat, comprehend all others; for to God we owe them all: but we here include, more particularly, Adoration of the Deity for his perfections; Thanksgiving for his past goodness, both to ourselves and to our fellow-men; Prayer for its continuance; Submission to his will; and Obedience to his laws, whether recognised in nature or in revelation.

Among the Perfections of the Deity, which demand our highest veneration, we may name his *Eternity* and *Ubiquity*, or existence in all time and space; his *Omniscience*, or infinite knowledge and wisdom; his *Omnipotence*, or infinite power; his *Excellence*, or infinite purity and glory; his *Benevolence*, or unspeakable kindness; his *Justice*, which time may impeach, but eternity will vindicate; and his *Mercy*, in providing a way of salvation, by an eternal and infinite sacrifice, by which he may be just, and yet a Saviour of sinners,—of every one who will accept the proffered grace. In reverencing the Deity for these perfections, we are necessarily inspired with those emotions which conduce to a virtuous life; and hence, such reverence becomes a part of our moral duty, aside from its higher or religious bearing.

No system of Morals can be complete, which does not lay its foundation firmly on our unchangeable relation to the Deity, and our obligation to worship him in spirit and in truth. By Prayer and Thanksgiving, we draw near to Him; and, in this communion, our worldly passions are purified, or brought back to their healthy state. Submission to His will, has a like effect upon the mind; especially in affliction; which often serves to wake the drowsy soul from dreams of earthly bliss, and wing its flight for heaven. As we are bound to *obey* the divine law, it is also our duty to *study* this law; both in the book of nature, and in that of Revelation. The more we study the Bible, the more we shall realize that it is indeed the inspired book of Eternal Wisdom. The peculiar duties which it inculcates;—Repentance and Faith in the Saviour, and the observance of the Christian Sabbath and Ordinances; are those which nature must sanction, though she could never teach: and they alone can prepare us for that spiritual world to which we are rapidly advancing. Of these duties, we are to treat farther, in a subsequent department; and we therefore conclude the branch of Ethics by repeating the expressive terms of Scripture; Love to God, and Good Will toward men; as the sum and substance of morality; the fruits of Christian piety; and among the essential conditions of happiness; both in this life, and in that which is to come.

CHAPTER V.

EDUCATION.

Education, is that branch of knowledge which relates to the training and guardianship of young persons, from infancy to mature age. The name is from the Latin, *educo*, I bring up, or educate; and it has also been termed *Pedagogics*, and *Pedeutics*, from Greek words of similar meaning. We would lay great stress on its importance; as relating to the preparation of youth for subsequent life, and influencing the character, and prospects, not only of individuals, but of nations,—through ages yet to come. The highest powers, and noblest sentiments of our nature, might remain forever dormant, were they not developed by the instruction of the wise and good; who have themselves received like instruction from their predecessors. But we may use the term Education in a still wider and higher sense, to include the whole training of the soul, by inward reflection and outward events, by intercourse with men, and instruction from above, —the whole training of the human soul, for the enjoyment of immortality.

That the ancients were not inattentive to this branch of knowledge, is shown by the *Cyropædia* of Xenophon; in which he developes his ideas of a perfect education;—as also by the institutions of Lycurgus and Solon; the former of whom made education a business of the state; and the latter besides prescribing public instruction at the Gymnasia, excused the son from supporting his parents, if they had taught him no trade. In modern times we may point to the example of *Oberlin*, who, in 1767, became the pastor of the Ban de la Roche; and instructed the poor peasantry, in religion and science, agriculture and the arts, till that sterile region became the happy abode of plenty, peace, and piety. Another noble example was that of *Fellenberg;* who, about the year 1800, devoted his fortune to the establishment of the farm school of *Hofwyl;* and has there perfected the *manual labor system;* by which the pupils labor for their own support, and thus practise the useful arts, while they are devoting a portion of the time to letters and science. He liberally adopted *Pestalozzi's* modes of instruction, by diagrams and experiments, in aid of verbal description; and many farm, or manual labor schools, have since been formed, on this improved model.

Another kindred improvement, is the system of *mutual instruction;* introduced, in 1797, by Rev. Dr. Bell, who borrowed it from the natives of Madras, in Hindoostan; and in the promulgation of which he was greatly aided by Mr. Lancaster. By employing the advanced pupils to instruct the younger, under the careful inspection of the Superintendent, it imparts the greatest possible amount of knowledge, where there is a deficiency of teachers. We have no room to describe the national systems of education, in Prussia, France, Scotland, and other European countries; or even in the different states of our own republic; but would refer, for information concerning the former, to the recent and able report of Prof. Bache, on Education in Europe; a like report to which, on American Education, is still a desideratum.

We proceed to consider the branch of Education, under the heads of Physical, Intellectual, Secular, and Religious; concluding with some brief views of Public Education, as compared with Private, and the provisions required for its support.

§ 1. *Physical Education*, includes the instruction and supervision which are required for the health, strength, and developement of the body; depending on the principles of Anatomy, Physiology and Hygienics; the study of which in full belongs to the department of Androphysics. We can here only allude to the effects of air, temperature, clothing, cleanliness, diet, exercise, rest, and regular and proper habits, on our physical wellbeing. The *air* which we breathe, yields oxygen to the blood; without which, life would soon become extinct; as in cases of drowning, or suffocation. The oxygen of the air, is partly exhausted by the first breathing, and still more by a second and third: hence the absolute necessity of pure and fresh air, to preserve health and life. Confinement in a close room, especially in a crowd, or with a close fire, is a frequent cause of debility and disease; and its effect soon becomes visible upon the countenance, as well as the feelings, of the person thus confined. If the weather be not too damp and cold, it is doubtless better that children should pass much of their time in the open air.

The *temperature* which children require, varies with their constitution; but, generally, we think it best that they should be frequently exposed to as great extremes as they can safely bear: the effect being to make them more hardy and vigorous. The limits of safety will vary much with their constitution and habits; for the same exposure which would be beneficial to one, might be injurious or fatal to another. Their *clothing* should of course be adapted to the temperature; and not too tight. Neither should it be too warm; but yet warm enough to guard them against being chilled, by sudden changes of the weather; especially when they are fatigued, or perspiring freely. On this account, flannel is preferable for the underdress; while it is less dangerous in case of its taking fire. Personal *cleanliness*, and frequent bathing, are also important; in promoting the insensible perspiration, so necessary to health.

The *diet*, should be such as is easily digestible; neither too coarse, nor too dainty. On this subject more will be said, in treating of Hygienics: but whatever be the diet, it should be taken at regular intervals, and never in excess. *Exercise*, is no less essential to the health than are food and rest. It stimulates digestion, circulation, and all the vital functions; preventing disease, languor, and enervation. It should be taken before, rather than after eating; and should be such as to call into action both the chest and the limbs. *Rest* should also be taken regularly, both as regards retiring, and rising early. Many other things belong to the formation and preservation of *regular and proper habits*, which we have no room here to mention.

§ 2. Under the head of *Intellectual Education*, we include the acquisition of useful and ornamental, scientific and literary knowledge; such as may be attained in seminaries of learning. How far this acquisition may be carried, in individual cases, will depend on many conditions: but there are some branches of knowledge, so practically useful, and so essential to good citizenship, that we think the study of them should be required of every youth, by legislative enforcement, and, where it is necessary, by pecuniary aid from the state. Among these essential branches, we would mention Reading, Writing, Arithmetic, Geography, and Grammar; as the lowest permissible degree of attainment. If these studies be tolerably acquired, they will enable any individual, however humble be his station, with the facilities which our age and country afford, to make farther advances in knowledge; each step of which will render still farther attainments more easy. The studies next in importance, in the common walks of life, are, we think, the first principles of Morals, Government, History, Geometry, and Natural Philosophy, including Astronomy and Chemistry; the theory of Agriculture and the Mechanic Arts; and especially the study of the Bible, its evidences, doctrines, and precepts. Those who aspire to intellectual eminence, of course will climb far higher than this, up the hill of science; but the studies here named should, we think, be taught in our Common Schools, and should occupy the attention of young persons generally, during a part of each year, until the age of maturity.

The time, we trust, has gone by, when more general knowledge, and higher studies, were deemed superfluous, to all except professional men,—the lawyer, the physician, or the divine. It is now admitted by many of the best judges, that a more liberal education, either Academical or Collegiate, may be alike beneficial to the Farmer, the Mechanic, and the Merchant; as serving to expand and quicken the mind, and to prepare the aspiring youth, not only for engaging in the labors of his profession, but for adorning a higher station, and becoming more extensively useful, should prosperity attend his career. At least, the study of languages and calculative processes, of mental and physical philosophy, of historical and political truths, of the works of nature and of art, will lay a wide basis for intellectual cultivation; and it will be the student's own fault if it is not improved, for his secular and eternal benefit.

The value of the Greek and Latin languages, is, we apprehend, often underrated. As sources of our own tongue, and of all the modern languages of Southern Europe, they deserve the attention of all thorough scholars; aside from the rich treasures of history, poetry, and philosophy which they embody. With regard to the best order of the higher branches of study, we have high authority for advising that the Languages should be studied before Mathematics and Physics; and that these subjects should be studied before Mental, Moral, and Political Philosophy. Geography, and History, and the Physical Arts, may be regarded as subordinate subjects, and pursued at intervals, by way of relaxation. The number of studies pursued together should, we think, be very limited; one subject being predominant, and one or two others serving to relieve the attention from too close confinement.

The great object of the teacher, should be to give interest to the subjects of study;—by clearing up difficulties, where insurmountable; though still leaving full exercise for the faculties of the student; by explaining the reasons, if they can be assigned, for every principle and process; and by tracing the various relations and applications of each subject, so as to show its connective importance: in all which, amusement may often be combined with instruction.

§ 3. Under the head of *Secular Education*, we place the acquisition of a Trade or Profession; and the study of Economy, Method, Manners, and Morals, as preparatory to the duties of this present life. Even the young heir of countless thousands, would be uneasy and exposed to every temptation, without some regular employment; and hence far happier for having learned some regular and worthy pursuit. His wealth will be squandered less thoughtlessly, if he has experienced the toil of acquiring it. But let no young man regret the want of wealth, who is blessed with health and strength, and the means of acquiring a trade or profession: for this will enable him, by perseverance in well doing, and with the favor of Providence, to build up a name and a fortune of his own, no less honorable than that which is obtained by inheritance. He may at least acquire competence, if not wealth; respect, if not distinction; influence, if not power; and happiness, which princes might sigh for, though it be in the common walks of life.

When circumstances permit, the choice of a profession should not be made, till the mind is sufficiently mature, and cultivated, to appreciate the various pursuits of life; and to judge what one is best adapted to its powers, or suited to its taste. Hence, those who can study, or survey the wide range of arts and sciences, during a thorough education, before commencing their career, will have the vantage ground in the race, if they do not wait too long in choosing their goal. It is a great error, though often committed, for young men of feeble frame, or delicate health, to engage closely in sedentary, and especially literary pursuits; which sedulously followed, are perhaps the severest of all to the physical constitution. Men of vigorous frames, are often worn out prematurely, by too close mental application; which the wisdom of antiquity pronounces to be "wearisome to the flesh." In every profession there is room for Method and Order; "a time for every thing, and every thing in its time; a place for every thing, and every thing in its place." We must conclude this topic by observing that Punctuality, Fidelity, Industry, Skill, and Honesty, combined with Economy, Good Manners, and Morals, and a desire for Self-improvement, have raised many men of humble station to the illustrious distinction of being benefactors to their race. On the selection of Friends, forming of Alliances, management of Property, and on the details of Manners and Etiquette, we have no room here to dilate.

§ 4. *Religious Education*, includes all that instruction which enforces the duties of young persons to their Creator, and the reasons therefor. Of these duties, we have already briefly spoken, under the branch of Ethics; alluding to the importance of Piety, as including the whole of Morality, and as the only source of true happiness. We think that Parents sometimes err, in attempting to give formal instruction, on this as on other subjects, before the mind is mature enough to comprehend it. It is not by teaching catechisms mechanically, nor by a system of rigid, unnatural austerity, that religion is best instilled into the young mind; but by training its affections; by exciting religious meditations; and by connecting the duties of Christian worship, and practice, with all the endearments of home, and social intercourse.

The most pleasing instruction, for the young mind, is doubtless that conveyed in the narrative form. Hence, the descriptive, and pathetic passages of the Bible, will be read with interest, and their lessons of truth imbibed, by the youngest pupils;—those to whom the more abstruse and doctrinal parts would be unintelligible. Religion, like many other things, is best taught by example; and the Christian Parent should hence derive new motives to watchfulness and piety. Family worship, in the still evening hour, has an influence that few hearts can resist;—an influence that comes over the feelings like the dews of heaven on the thirsty earth, pure and refreshing. The Sabbath School is a valuable auxiliary to Christian education; but it should not usurp the place of parental instruction, and example.

As reason advances to maturity, the young mind is prepared to receive and comprehend the sublime doctrines of Christianity, and the basis on which they rest. Then it is that systematic instruction comes in place; and the Catechism and Articles of Faith may be studied with interest and advantage. But while some Parents err in bringing these subjects forward too early, the solemn truth must be told, that the far greater number go to the opposite extreme of neglecting such instruction, and leaving their children to the influence of every chance associate, unguarded and unarmed against the approach of evil. The sad effects of such neglect, those Parents often live to witness; though generally too late to remedy them, even did they perceive the cause, and make the attempt.

§ 5. On the relative advantages, and different Systems of *Public* and *Private Education*, we must speak with extreme brevity. Could every Parent qualify himself, and devote the requisite time, he would be the best of all teachers: and no aid from others can entirely exonerate him from taking a part in the great work. Could private teachers always be procured and compensated, home would still be the best school, morally, if not intellectually. But as these conditions are generally unattainable, our resource is found in public schools, academies, and colleges; the support of which we regard as a sacred duty of every statesman, moralist, and Christian. The support of schools, we may add, is incomplete, without provisions for educating competent teachers; and for securing those who will guard the morals, as well as train the understanding.

We believe that *Infant Schools* may be made useful, if properly managed; so that they do not injure the health of children, by too long sitting, and close confinement. This may be obviated, by allowing them to stand, or march, or sing; with frequent intermissions for more active exercise, under the eye of the teacher. Their attention should first be turned to sensible objects; next to pictures and diagrams; and, lastly, to books: but systematic instruction, we think, should be delayed, till they have acquired a stock of ideas, and made some progress in the exercise of their reasoning powers. After all, such schools are chiefly useful, in those classes of society where children would otherwise be physically, mentally, or morally neglected. For those who have willing and competent parents to take charge of them, there is no place like home.

We think that the system of *Mutual Instruction* might be extensively and usefully applied, were school-houses properly arranged, for several classes to recite at the same time,—and were a certain portion of time devoted by the teacher to a thorough examination of the classes instructed by monitors, in presence perhaps of the whole school. Most of our common schools are already conducted more or less on the *Manual Labor System;* the scholars laboring a part of the day, or a part of the year, in assisting their parents at home. This is a principle, which, if not carried so far as to interrupt their course of study, we cannot hesitate to approve. We have no doubt that a portion of the time devoted to manual labor, would be beneficial, rather than injurious, to the studies and health of Collegiate and Academical Students;—but how large a portion it should be, we will not here attempt to decide.

III. DEPARTMENT:

NOMOLOGY.

In the Department of Nomology, we include those branches of knowledge which treat of Law, Legislation, and Government. The name is derived from the Greek νομος, law; and it is used by Ampère, in his Classification of the Sciences, though in a more limited sense. We include under Nomology, both *Statesmanship* and *Jurisprudence:* the former comprehending the subjects of Government and Legislation; while the latter comprehends the study and application of the Laws which result from the former. The term *Politics*, properly signifying the science or principles of government, is now, we think, too widely perverted, and too vaguely used, to be an appropriate name for this department of knowledge. The studies here included, affosd a wide range for reason and research; and rank high in relative importance, as greatly contributing to the protection of individuals, and the advancement of society.

The term *Law*, from the Saxon laᵹa, signifies in general a *rule of action*, whether relating to animate or inanimate objects: but in a technical sense, it may be defined, a *rule of conduct;* prescribed by the common consent of nations, to regulate their intercourse; or by the supreme power in a state, to define the civil rights and duties of its officers and citizens, and of foreigners, when under its control. The necessity for such laws arises chiefly from the tendency, both of nations and individuals, to selfishness and injustice, when not restrained by some efficient power or motive. They have therefore adopted these rules as a standard of civil conduct; the violation of which is punished, in the case of individuals, by the judicial and executive powers; and among nations, by non-intercourse, by retaliation, or too often by an appeal to arms, the last arguments of kings.

As regards their immediate sources, Laws may be distinguished as either *Divine*, or *Human:* the former emanating directly from the will of God: the latter framed by men; though they are wise and safe only when they conform to the divine law. If History can cite examples where human laws have conflicted with those of the Deity, it can also prove that such laws have uniformly resulted in misery, or destruction, to those who framed or adopted them. *Natural Law*, depends on the principles of justice and expediency, already alluded to in the branch of Ethics: and, next to the Divine Law, it should form the basis of Legislation. *Conventional Law*, is that which is mutually established by the parties concerned; as in true Republics: while *Arbitrary Law*, is that imposed on the weaker party by the stronger; as in Monarchies, and especially in Despotisms.

As regards their form, Laws may be divided into written, and prescriptive. *Written Laws*, are those which are established by positive enactment: and they consist of Constitutions, Treaties, and Statutes. By a *Constitution*, we here mean a solemn, written declaration of the sovereign will of the people, defining the form, mechanism, and powers of the government. In Great Britain, however, and in other countries, the term is applied to the system of government which has grown up, under various influences; and which has been acquiesced in, rather than ratified by the people. A *Treaty*, is a solemn, written compact, between independent nations; or sometimes between nations, and subordinate or tributary states. A *Statute*, is a law duly enacted by a competent legislative power: and it may be either a *public* statute, relating to the whole community; or a *private* one, relating only to certain individuals or associations.

Prescriptive or Unwritten Laws, are those established by prescription, or ancient usage: as the Common Law, and Chancery. *Common Law* is an extensive system of rules and principles, the growth of ages, resulting from natural justice, and judicial decisions, and applied in cases not otherwise provided for. It is called unwritten, simply because it is not found in the Statute Books; though it is mostly embodied in the Reports of causes decided, and principles settled in the various Courts of Justice. *Chancery Law* or *Equity*, embraces those general principles by which Courts of Chancery or Equity are governed, in deciding on appeals made to them, as the last arbiters, from Courts of other grades. Though founded on natural law, these principles are now for the most part settled, like those of the common law, by prescription and judicial decisions.

The term *Civil Law*, was originally applied, and is often restricted to the old system of Roman Law: but we may also use it, as in the French Civil Code, to include the Relations of Persons and Property; or the Rights of Persons and the Rights of Things; in contradistinction from *Criminal* or *Penal Law*, which relates to Crimes and Punishments; or Private Wrongs, and Public Wrongs, and the means of redress. *Mercantile* or *Commercial Law*, called also Law Merchant, prescribes the rights and duties of merchants, in their relations to each other, and to their respective countries. *Martial Law*, comprehending both Military and Naval, is that system which prescribes the rights and duties of military and naval men; or which is enforced in places that are the seat of war. *Ecclesiastical* or *Canon Law*, is that system which relates to the affairs of the Church; and which is the rule of Ecclesiastical Courts, whether under secular or sacerdotal authority. A system, or body of laws relating to any one of these divisions, or belonging to and one nation or state, is called a *Code*.

With these introductory remarks, we proceed to the individual branches;—Political Philosophy; International Law; Constitutional Law; Municipal Law; and Political Economy;—under which we think that all the topics of Nomology may be comprised.

CHAPTER I.

POLITICAL PHILOSOPHY.

The branch of Political Philosophy, may properly include all theories and general views of Government; with a description of its different forms, the principles on which they are founded, and the modes in which they are administered. The name is derived from the Greek, πολις, a city or state; whence also the term Politics, already referred to. This study rests upon the basis of Natural Law, or justice; and therefore presupposes a knowledge of Ethics; the principles of which have already been explained. It requires also enlarged and elevated views of human nature, and the constitution of society; with the means by which virtue may be diffused, justice enforced, and order preserved, throughout the community. It is alike important to the Statesman, who administers the affairs of a nation; and to the Legislator, who is concerned in making or amending the laws, though not directly engaged in their execution.

The earliest works of value on this subject, were Plato's *Republic*, and Aristotle's Treatise on *Politics*. Aristotle, and other ancient writers, reduced all governments to one of the three forms, Democracy, Aristocracy, and Despotism; the only forms with which they were acquainted. Cicero, in his work *De Republica*, endeavored to show by what policy, morals, and resources, Rome had obtained the dominion of the world;—and later writers have shown by what vices and weaknesses she lost it. In modern times, Macchiavelli's work, entitled *The Prince*, developes the various means of acquiring absolute power: and whatever may have been its object, it affords much political instruction. Montesquieu's *Spirit of the Laws*, published in 1748, is a work of much value on this branch of knowledge; in which he regards all governments as either Republican, Monarchical, or Despotic, and discusses very fully their principles and mechanism. To this branch, in part, belong the great works of Grotius, Puffendorf and Wolf, which treat largely of Natural Law; though in connection with the laws of nations.

In England, Sir Robert Filmer's *Patriarcha*, published in 1680, maintaining the divine right of kings, was the occasion of Sydney's and Locke's masterly treatises, in defence of the rights of the people; rights which had previously found a champion in Milton. Locke's doctrine of an implied *social compact*, or consent of the people, as the only legitimate source of power, though opposed by Mr. Hume, has been gradually prevailing; and in our own government has found its full application. Waiving further reference to Rutherford, Ferguson, Bentham, and other later writers on this subject; we have only room to add that the principle of *representation*, by which the people select legislators, as well as executive and judicial officers, to act in their behalf, may we think be regarded as the greatest of modern improvements in government, and the avenue to any further improvements, of which, limited as our faculties now are, this science is susceptible.

We proceed to treat of Political Philosophy under the heads of Theory of Government; Principles of Legislation; Principles of Adjudication; and Principles of Administration, or Statesmanship and Diplomacy.

§ 1. The *Theory of Government*, investigates the principles of the different forms of government; and the mechanism by which they are made to fulfil their great objects, the security and improvement of individuals and of society. The principal forms of government are Monarchies, Aristocracies, and Democracies, separate or combined. A *Monarchy*, is that form, in which the will of one man, styled monarch, emperor, king, or otherwise, is the supreme law of the nation. If his will is restricted by charters, constitutions, or other means, the monarchy is said to be *constitutional* or *limited;* but if not, it is called an *absolute monarchy* or a *despotism*. A *Mixed Monarchy*, is one in which the supreme power is shared with the nobles, or people, or both. An *Aristocracy*, is that form, in which the government is controlled by a privileged class of men; whether their power be hereditary, or derived from their own body, by *intro-election*. An *Oligarchy* or government of a few men, as of the former Council of Ten in Venice, is perhaps the most despotic form of an aristocracy. A *Democracy*, is that form, in which the supreme power is shared by the whole people; either immediately, as in the *Pantocracies* or Republics of Greece and Rome; or by agents of their own selecting, as in our *Representative Democracies;* to which the term *Republic* is now most frequently applied.

The first governments were doubtless either patriarchal or military; and the origin of political society may be traced back, first to the primitive establishment of families; next, to the union of families in tribes, under one or more chiefs or leaders; and lastly to the union of several tribes, either voluntarily or by conquest, in one great nation. The origin of aristocratic and democratic forms of government, may we think be traced to the abuse of supreme power, in the hands of individual chiefs or monarchs; which led the people to take the reins into their own hands. Such was the origin of the Roman Republic, called into existence by the enormities of the Tarquins; and of the French Republic, evoked by the follies of the Bourbons. At the present day governments rest on the voluntary consent of the governed; or on implied consent, with long acquiescence; or on the coercion of superior force.

The object of civil government being the welfare of the whole community, it is necessary that each individual should surrender a portion of his *natural liberty*, by obeying the laws, in return for the protection which they afford to his person and property. The highest practicable degree of *civil liberty*, is that which remains after this necessary surrender. It is important that the legislators and magistrates should themselves be subject to the same laws as their fellow-citizens; and responsible to the latter for the due execution of their trusts. The two great safeguards, against the abuse of power, are its distribution in different hands, and their liability to impeachment or removal from office, for neglect of duties, or abuse of delegated powers. Hence arose the division of authority which now prevails, in the best governments, between the legislative, judicial, and executive departments: each having a check on the power of the others. Of these departments, we proceed briefly to speak.

§ 2. The *Principles of Legislation*, include the organization of legislatures; legislative forms, or parliamentary usages; and the principles of natural and divine law, on which all laws should be founded. *Legislative power*, or the power of making laws, even when entrusted to the immediate representatives of the people, is found to be most safely vested in two co-ordinate bodies, whose separate consent should be necessary to the enactment of a law. The more popular branch should of course be so numerous, as to secure a full representation of the interests and wishes of the whole people; beyond which an increase of numbers obstructs the efficiency and weakens the responsibility. The other branch of the legislature should be so limited as to embrace only the highest order of political talent, experience, and wisdom. Each house of the legislature is usually organized by the appointment, or election of a presiding officer and one or more clerks, or recorders of its proceedings; and each house is the proper judge of the qualifications of its own members.

In the proceedings of legislative, as of other deliberative bodies, certain rules are necessary to be observed, for the preservation of order, and expediting of business. Such rules, having been introduced into the British Parliament, at an early period, have been very generally styled *Parliamentary Rules* or *Usages.* Those of our Congress and State Legislatures, though founded on the English rules, have been modified, as the spirit of our institutions, and the change of circumstances required; and they are still liable to farther modifications. They relate to the duties of the presiding officer; the mode of qualifying members; the general order of business; the reference of subjects to committees, or to a committee of the whole house; the mode of receiving and acting upon bills or amendments; the courtesy due to co-ordinate houses, or to the executive; the recording and verification of the journal; and similar topics, of which we have no farther room to speak. These rules are the more important, from their being used in regulating the proceedings of public meetings generally; even those for religious or scientific purposes.

The style of laws should be as precise as possible; and they should be changed as seldom as a due regard to the public welfare will allow; lest they should lose in dignity, and fail in the requisite publicity. They should of course be founded in justice, and should be as few and as simple as the condition of society will admit; leaving things to regulate themselves, wherever they are not likely to produce public injury; unless much good will clearly result from positive legislation. The object of good laws should be, not only to punish crimes when committed, but as far as possible to prevent the commission of them. Montesquieu very properly enumerates four species of crimes; those against religion; against morals; against private security; and against public safety; all of which come within the cognisance of legislative authority; and require active measures for their prevention of punishment.

As regards *punishments*, they should be commensurate with offences; and so framed as if possible both to redress the injured party, and vindicate the violated laws; having reference also to the prevention of future crimes, and the moral reformation of the offender. Among the various reasons theoretically assigned to justify the infliction of punishments, those to which we have just referred, including the preservation of public safety, seem to be the strongest. The public exhibition of *capital punishments*, we are fully persuaded, has a very demoralizing and injurious effect; but such punishment may, we think, be justified in extreme cases, by reason as well as by Scriptural authority. Still it remains a question, with some minds, whether, even in these cases, solitary confinement would not be preferable. Imprisonment for debt, we conceive to be justifiable, only where the debtor is chargeable with fraud, or culpable negligence, in contracting obligations without providing the means of discharging them.

§ 3. The *Principles of Adjudication*, or judicial action, relate to the organization of courts, with the right construction or interpretation of laws, and their due enforcement. Were the power of executing the laws intrusted to the same persons who make them; it would be much more likely to be abused than when placed in different hands. Hence the propriety of distinct *Courts of Justice*, and these of different grades; that there may be room for appealing from the lower to the higher, in cases of supposed injustice. The *Judges* or justices are properly nominated by the Chief Magistrate of the Nation, or State; but to prevent corruption, they should be approved by some responsible body, and should afterwards be independent of the appointing power, at least for a long term of years, except when impeached for misconduct. A *judge* should not only be impartial, but he should pay implicit obedience to the law, without regard to its merits; except in chancery or constitutional questions; his office being not to make the law, but to declare and enforce it. In general, more confidence may be placed in the decision of three or more judges, than in that of a single individual, though of equal capacity.

To secure more effectually the rights of citizens, the law allows them, in many cases, the privilege of trial by a *Jury*, composed of their fellow-citizens, who are supposed to have an immediate interest in doing them full justice. The origin of this institution is lost in antiquity; but it was confirmed in England, by Henry II. in the Constitutions of Clarendon, in 1164. The number of jurors, and mode of selecting them, vary in different places and courts. A *Grand Jury*, consists of at least twelve, and usually, when full, of twenty-three persons; who are charged with a general supervision of the public safety, interest, and morals. *Petit Juries*, on the other hand, are summoned and sworn for the trial of special causes. The other officers of a court of justice, are the *Clerk* or *Prothonotary*, who records its proceedings and decisions; and the *Marshall*, *Sheriff*, or *Constable*, who executes its processes and orders. The *Attorneys*, *Solicitors*, and *Counsellors*, or *Advocates*, are lawyers, commissioned by the court, to manage causes before it. An *Attorney* or

Solicitor General, is a lawyer specially appointed by the executive, to manage causes in which the government is a party directly concerned.

The *jurisdiction* of a court, signifies the extent of its powers, in regard to the causes which may be tried before it. It has *original jurisdiction* in cases which may come primarily before it; and *appellate* jurisdiction, in those cases which can only be brought before it by an appeal from some other court. Jurisdiction is also termed *civil*, when it extends only to the rights of persons and property; and *criminal*, when it extends to the trial of imputed crimes. Of *legal hermeneutics*, or the just interpretation of laws, we have only room here to remark that it depends upon the same principles as biblical hermeneutics; that is, the just principles of grammar, logic, ethics, and sound criticism in general.

§ 4. The *Principles of Administration* of governments, comprehend the greater part of what is usually termed *Statesmanship*, including *Diplomacy*. They relate to the duties of the chief Magistrate, and his immediate assistants and advisers, whether called *Secretaries*, *Ministers*, or by other names. The propriety of having a single and responsible chief, at the head of every government or society of men, is too evident to need any argument. Whether that chief be called President, or Consul, or King, or Emperor, is far less important, than that he should feel himself responsible to the people, for the manner in which he exercises the power confided to him; and that he should be competent to direct the government beneficially and wisely, with the aid of competent assistants and advisers.

The necessity of a cabinet, or ministry, to assist the chief magistrate, will at once appear, from the manifold duties of the executive branch. These duties are, for the most part, supervisory; to see that the laws are faithfully executed, and to advise for their alteration or improvement; to manage the fiscal and financial affairs of the nation; to superintend public improvements; to preserve friendly intercourse with foreign nations; and to provide for the public defence, with the aid of the military and naval forces. Accordingly, in most governments, there are distinct departments, of *State*, for correspondence and intercourse with foreign powers; of the *Treasury*, or of Finance, for the collection and disbursement of the public moneys; of *War*, for the management of military affairs; of the *Navy* or Marine, for naval affairs: besides others for various express purposes, as Posts, and Mails; Internal Improvements; Education; Patents; and the like.

Diplomacy, is that portion of Statesmanship, which relates to the intercourse of a government with foreign powers, by means of its accredited agents. It treats of the qualifications, and the duties of these agents; and the rules and precedents by which they are governed in their official acts. Diplomatic agents of the highest rank, are called *Ambassadors*, or *Ministers;* of whom *ministers plenipotentiary*, and *envoys extraordinary*, usually take precedence. *Resident ministers* rank next; and inferior to these in official grade, are *Chargés d'affaires*, and finally *Secretaries of legation*, and *Attachés*. As the interests and honor of a nation are confided, in a great degree, to an ambassador, he should of course be a person of great dignity; of extensive knowledge; well versed in the forms and courtesies due to his station; familiar with the affairs both of his own state, and of that to which he is accredited; and of uncompromising integrity. When affairs of the highest importance are to be transacted, it is perhaps the safest, to intrust them to a *Commission*, or *Embassy* of several persons, of the highest capacity, and with joint powers.

Consuls, as they are now styled, are regarded by some as diplomatic officers; but more generally, as commercial agents, stationed in foreign parts, to afford protection to their fellow-citizens, and perform certain magisterial and legal duties; being themselves subject to the civil authorities of the places where they reside, at least, in criminal cases. It is usually a part of their duty, to watch over the fulfilment of commercial treaties, in their respective vicinities; and to transmit to their own government any information which they may deem of service. A *Consul General*, is one appointed for several places, or over several other consuls.

CHAPTER II.

INTERNATIONAL LAW.

The branch of International Law, frequently, though less properly, called the *Law of Nations*, comprises that system of rules, which defines the rights, and prescribes the duties of nations, in their intercourse with each other. It does not properly include what have been termed the *internal laws of nations*, or the rights and obligations which subsist between the government and the citizens of the same state; and hence those laws are here referred to the subsequent branches of Nomology. But it does properly include the subjects of *Commercial*, *Maritime*, and *Admiralty Law;* in so far as they are instituted not by any one nation singly, but by the common consent of two or more sovereign states. International Law is based upon the principles of justice; and it consists of the natural or necessary laws; the prescriptive, or customary laws; and the positive, or express laws; by which the intercourse of nations is regulated.

A *nation*, or *state*, is a community, or body of men, united under one government, for mutual safety and benefit. It consists of officers, who are its agents; and of citizens, from among whom those officers are selected, or to whom they should be responsible. Nations are here considered as *moral persons*, possessing certain rights, and having certain duties to perform, in that capacity. And what is incumbent upon a nation, is morally incumbent on all its citizens, according to their respective stations and circumstances. The rules which prescribe the rights and duties of governments towards each other, are sometimes termed *public laws*, and those relating to the citizens of a nation, in regard to foreign powers, are then termed *private laws*, of nations. It is an admirable remark of Montesquieu, that nations ought to do each other as much good in peace, and as little harm in war, as possible, consistently with the attainment of their just and reasonable objects.

Perhaps the earliest example of International Law, was afforded by the Grecian States, in the establishment of the *Amphictyonic Council;* which was designed to settle all disputes between them; though it failed of success. Rome, in its infancy, made some approach to an international code; particularly in the institution of a college of heralds, and of the fecial law: and this subject found an able advocate in Cicero; but still the principles of just intercourse with other nations were often violated. At a later period, when the Roman Law became most highly cultivated, the law of nations was incorporated therein, to a considerable extent, though not in a separate or systematic form. Since that period, the Christian religion, the crusades, the institution of chivalry, the feudal system, and the family alliances of European sovereigns, have successively favored the development of International Law, as now generally recognised and understood.

The great work of Grotius, *On the Rights of War and of Peace,* (De Jure Belli et Pacis), published in 1625, was the first which reduced International Law to a regular system; procuring for its author the title of father of this science. Puffendorf, in his work *On the Law of Nature and of Nations,* (De Jure Naturæ et Gentium), published in 1672, treated the subject in a highly philosophical manner: but the treatise of Vattel on the *Law of Nations,* (Droits des Gens), first published in 1758, has contributed, perhaps, more than any other work, to give influence and popularity to this important study. The influence of these and similar works, in modern times, is shown, we think, in the frequency of treaty stipulations; settling points of international law, at least between the parties concerned, which, in former times, might have caused long and bloody wars, and finally have been decided by force, rather than by justice.

We proceed to treat farther of International Law, under the heads of Laws of Nations in Peace; Laws of Nations in War; Maritime Law; and Commercial Law.

§ 1. The *Laws of Nations in Peace,* depend upon the principle that nations, like moral persons, are responsible for their actions, and equal in respect to their rights and duties; whatever difference may exist in their strength, extent, forms of government, or systems of religion. Every nation therefore has a right to choose its own form of government; to exercise exclusive jurisdiction over its own territory, and the adjacent waters, so far as may be necessary for its defence; and to regulate its commerce and intercourse with other nations; provided always that it observe the principles of justice, including of course, conformity to its treaties and other obligations. Foreigners, residing in any nation, are amenable to its laws, unless they be public ministers; and in return they are entitled to protection for their persons and property. Criminals, fleeing from justice out of their own country, should be surrendered, on due proof, to the government of the injured party; since they cannot be seized by the same in another nation's territory. The granting, by one nation, of a free passage across its territory, to the citizens or troops of another, is a matter of courtesy and good will; always subject to the restrictions necessary for its own safety.

Every nation is bound to respect the *ambassador* or *public minister* of another nation, so long as the laws of nations are respected by him. As the representative of his nation, his person is inviolate; nor is he subject to the laws of the nation receiving him. He may be ordered away, or, if necessary, expelled; but if practicable, complaint should first be made to his own government, that he may be recalled. A government may, at its discretion, refuse to receive an ambassador; but then it should speedily explain to the government sending him, the reason for this refusal. Treaties made by ministers, are not understood to be binding, until ratified by their respective governments; unless made by ministers plenipotentiary, clothed with full and irrevocable powers. If there be a dispute concerning the rightful government of a foreign nation, the government *de facto*, or actual government, is the one usually recognised.

As every nation is bound to protect its own citizens, in the enjoyment of their rights, an injury to a single one of them, if reparation be refused, may be deemed a cause for war; though war may not, even then, be advisable. In such cases, the injured citizen is doubtless entitled to reparation from his own government. Disputes between nations, may be settled by mediation, by conference, or by arbitration: and not until all attempts to obtain justice by these means have failed, can there be just cause for war.

§ 2. The *Laws of Nations in War*, presuppose that war is undertaken only in order to obtain justice, when all other means have failed. War is the *ultima ratio*, or last resort, of nations who acknowledge no earthly superior, but appeal to the God of battles in defence of their existence, liberty, or other dearest rights. Sometimes recourse is had to a limited warfare; as by retaliation, reprisals, blockades, or embargoes, to extort or compel redress. A *blockade*, is an interception of all communication with a place, by the fleets or armies of a hostile power: and an *embargo*, is an order of the government detaining the vessels of another nation, or interdicting all trade therewith, as a contingent means of redress or coercion. War is sometimes commenced, as it was among the Greeks and Romans, by a formal declaration of hostilities; but the failure of negotiations, and the withdrawal of ministers, is generally deemed a sufficient warning to the opposite party.

The effect of War is to put all the citizens of each nation, politically speaking, in a hostile position towards those of the other; suspending, but not cancelling their respective claims and obligations. It is just that foreigners in each country should have time to withdraw themselves and their property therefrom; but the law of reciprocity generally prevails; and if imprisonment or confiscation follow, they have a just claim on their own country for the damage. It is just, also, that actual hostilities should be restricted to those persons who are commissioned in the public service of the belligerent states; and that they should be permitted to act offensively only against armed forces and public property; but not against peaceable citizens. Captured goods are often bestowed on the captors; but captured territory becomes subject to the victorious power. A captured vessel may be ransomed; and the *ransom bill*, or note of promise given to the captor, is one of the few contracts allowable between hostile parties. A vessel recaptured, returns to its original owners, by the *jus postliminii*, which supposes that it had never ceased to belong to them. The poisoning of wells, or food; the injury of private citizens; the maltreatment of prisoners; and the violation of passports, cartels, flags of truce, conventions, or capitulations, are universally forbidden, among civilized nations.

Those powers, or states, which are not parties to the war, are called *neutral:* and they have important relations to the belligerents. They are expected to aid neither party; and their trade with both parties is restricted, but how far is not exactly decided. The neutral merchant may carry his own goods, if not contraband of war, to any ports of either hostile party, not actually blockaded: but a *blockaded* port he is not permitted to enter. All articles useful solely in war, are *contraband;* and other articles may become so, if carried to a besieged place, or designed to aid directly in carrying on the war. The punishment for carrying contraband articles, is generally the confiscation of the whole cargo. The *right of search*, usually conceded to belligerents, to see that neutral vessels have no contraband goods, extends only to neutral merchant vessels, and not to national ships. Neutral property, on board ships captured from the enemy, must be restored; but an enemy's property, on board of a neutral ship, may be seized by the searching vessel. Neutral territory is inviolable; protecting even the enemy's property; but the neutral nation may either grant or withhold free passage across its territory, so that it treat both the hostile parties alike. The character of individuals is either neutral or belligerent, according as they reside in neutral or hostile territory; or if they have no actual residence, it depends upon their previous intention, if clearly proved.

§ 3. *Maritime Law*, is that division of Jurisprudence which relates to crimes and transactions on the high seas; including the laws of maritime captures, and privateering; with those relating to piracy, the slave trade, and other offences; which in England are tried by the Admiralty Courts, but in our own country, by the Courts of the General Government. Contracts made upon the high seas may also be included under Maritime Law; and the distinction between this and Commercial Law is perhaps not very clearly defined. Many principles of Maritime Law, particularly those relating to maritime captures, belong to the preceding section of International Law; but as this division is separately treated of in other works, we have thought it proper to assign it here a distinct place. The English *Admiralty Court* was instituted by Edward III., in 1357; but received a more popular form, under Henry VIII., in 1517. Its jurisdiction extends to some cases of Commercial as well as Maritime Law; and to all such cases, the term *Admiralty Law* has been applied. Azuni, in his work on the *Maritime Law of Europe*, has the merit of being the first writer who reduced this subject to a regular system.

The necessity of requiring a judicial decision to legalize captures of merchant vessels, in war, will appear from the abuse to which this practice would otherwise be exposed. Hence *privateers*, commissioned by government to make such captures, are forbidden to dispose of them, till they are legally condemned, by some court of the captor's own country. Even those merchant vessels which are captured by national ships, must, we believe, undergo this legal condemnation, at least before they can be safely purchased by any individual citizen. Such prizes become the property of the state; though their proceeds are usually distributed among the captors, as a reward for bravery, and a stimulus to exertion. All seizures, under the laws of impost, navigation or trade, when those seizures are made on waters navigable from the sea, by vessels of a certain size, may also be considered as under the cognisance of Maritime Law. *Piracy*, including the seizure of vessels, or robbery and murder on the high seas, is punishable with death by the law of nations; and *pirates*, on becoming such, cease to have any national rights; but are held amenable to any nation, into whose hands they may fall. Several nations, including the United States and Great Britain, have already agreed to rank the *slave trade* in the same heinous class of crimes. Most others have forbidden it; and it is to be hoped that all will soon effectually unite in putting a stop to this horrid traffic.

§ 4. *Commercial Law*, otherwise called Law Merchant or Lex Mercatoria, "is that which relates to trade, navigation, and maritime contracts; such as those of insurance, bottomry, bills of lading, charter-parties, general average, seamen's wages; and also to bills of exchange, bills of credit, factors and agents." Cases of these kinds between citizens of different nations, evidently rest on principles of International Law, which no one nation can greatly alter; and in our own country, they are mostly tried before the Courts of the General Government. The earliest laws of this kind were probably the *Rhodian Laws*, of which some fragments only remain. The *Amalfitan Table*, prepared at Amalfi, in Italy, about 1096; the *Laws of Oleron*, prepared at Oleron, in France, in 1266; and the *Consolato del Mare*, probably digested at Barcelona, in Spain, in 1494; were the basis of Commercial Law; which has since been improved by the French Ordinances framed by Colbert; by the labors of Lord Mansfield, who first methodized the system in England; and in our own country, by the able decisions of Marshall, Story, and other jurists.

Marine Insurance, rests on a contract, by which the underwriters, for a certain premium, guarantee a ship against loss; or if lost, engage to make good the damage. *Bottomry*, is the borrowing of money, by pledging the ship's bottom, that is the ship itself, in payment. A *bill of lading*, is a written statement of goods shipped; and it is usually directed to the person to whom they are sent. A *charter party*, is a written agreement, concerning the shipment and freight of a cargo. *Primage and average*, are certain contingent charges, as for towage and pilotage; and *general average* signifies extraordinary expenses and sacrifices, made to save the cargo, when in danger; as throwing articles overboard, paying ransom, and the like. On all these points, certain general rules and principles are understood, or agreed upon, by merchants, even of different nations: and hence these subjects become a part of International Law.

Cambial Laws, are those relating to Exchange; or the transfer and payment of moneys in distant places. A *bill of exchange*, is a written direction of one person, for another person named, to pay a sum of money therein mentioned, to a third person; and this bill may be sold to a fourth person, or by him to others, before it is regularly paid. The parties to a bill of exchange are called the *drawer*, who makes it; the *drawee*, or the person to whom it is addressed; the *payee*, in whose favor the bill is nominally drawn; and the *presenter*, who finally presents it for payment. When the drawee has acknowledged the bill to be payable by him, he becomes the *acceptor;* and any person guaranteeing the payment, by writing his name on the back of it, is called its *endorser*. Numerous and complicated cases may arise, under bills of exchange; but such we have no room here to consider.

CHAPTER III.

CONSTITUTIONAL LAW.

In the branch of Constitutional Law, using the term in its more general sense, we would include the study of the Constitutions, or fundamental laws of the various nations; that is, the structure and mechanism of their government, and the appointments, powers, and duties of their officers. In our own country, this branch is often limited to the Constitution of the United States, and the Statutes and Treaties framed under its authority; but even here, we think it should include the Constitutions of the several states, and the mechanism of their governments. The Constitutions, so called, of the Roman Law, were merely the edicts of the successive emperors. The famous *Golden Bull*, of Charles IV., issued in 1356, so named from its golden *seal*, was the Constitution of the German Empire; on which the present constitutions of Austria and Prussia have been partly modelled. It contained many chapters on the public law; together with the rules for the election and crowning of the emperors; the order and rank of the imperial court; and the functions of the arch-officers of the empire. In France, notwithstanding the existence of the ancient *States General*, of nobles and clergy, to which the *Third Estate*, or representatives of cities were added about the year 1300, the Constitution was chiefly monarchical and hierarchal, till the revolution of 1789; since which time France has had nine different constitutions, including the present one.

The English Constitution has been successively modified, by the *Wittenagemote*, or Council of Wise Men, of King Alfred; the *Feudal System* of William the Conqueror; the *Constitutions of Clarendon*, enacted in 1164, under Henry II., to check the papal power; the *Magna Charta*, or Great Charter of Rights, extorted by the barons from King John, in 1215; the Establishment of the

House of Commons, under Henry III., in 1258; and the recognition of the *Bill of Rights*, by William III. and Mary, in 1689. Excepting in the hereditary power of the king and house of lords, and the unequal representation of the people in parliament, it closely resembles our own Constitution, of which it was the principal model. The British Constitution is the result of the successive struggles of the people for liberty; and it exists, in part, by mere prescription; having never been digested or sanctioned, as a whole, by any positive act of the people.

The United States of America, having been originally British Colonies, brought with them the rights, laws, and institutions of their mother country: and most of them had local Legislatures, subordinate to the British Parliament. Their right to the soil, rested on purchases from the Indians, or conquests made in wars with them; and in regard to foreign nations, they held it by the right of discovery, in virtue of Cabot's first expedition, under the authority of King Henry VII. Having, for the most part, common interests, they several times formed a partial union; as in 1643, when the New England colonies united against the Indians; in 1754, when delegates met at Albany, to take measures against the French and Indians, but Dr. Franklin's plan of union failed; and in 1765, when a Congress of delegates from nine of the colonies met at New York, to oppose the stamp act, and to maintain their rights against the mother country. When at length the acts of Parliament, and the regal power became intolerable, they united in 1774, in a virtual league, or offensive and defensive alliance; and elected representatives to the *Continental Congress*, which, two years thereafter, declared "that these United Colonies are, and of right ought to be, free and independent states." Formal Articles of Confederation were proposed in Congress, in 1778; but they were not adopted until 1781.

The Revolutionary War left the states independent, but languishing under a feeble league, and inefficient form of government. With a view to the settlement of some local difficulties, resulting from this state of things, delegates from five states met at Annapolis, in 1786; and at their instance, a General Convention met at Philadelphia, in 1787, and framed our present *Constitution;* which went into operation March 4, 1789. Its preamble is as follows. "We, the people of the United States, in order to form a more perfect union, establish justice, ensure domestic tranquillity, provide for the common defence, promote the general welfare, and secure the blessings of liberty to ourselves, and our posterity, do ordain, and establish this constitution for the United States of America." The first article treats of the national legislature; the second, of the executive; and the third of the judiciary: the fourth defines certain relations of the states, and their citizens, to each other and to the Union; the fifth prescribes the mode of amending the Constitution; the sixth article recognizes the previous government, but declares that this Constitution shall be the supreme law of the land; and the seventh and last article, relates to its ratification.

We proceed to treat briefly of United States Constitutional Law, under the heads of Legislative powers; Executive powers; Judicial powers; State rights and restrictions; and United States Statutes and Treaties.

§ 1. The *Legislative powers* of the United States, are vested in a *Congress*, consisting of a Senate, and House of Representatives. The *Representatives*, are chosen every second year, by the people of the several states; among whom they are apportioned. They must be at least 25 years of age; must have been seven years citizens of the United States; and must be inhabitants of the state from which they are chosen. The House of Representatives chooses its own *Speaker*, *Clerk*, and other officers. The *Senate*, is composed of two members from each state, chosen by the legislature thereof, for six years; provision having been made that about one-third of the number shall be elected every two years, in place of those whose terms expire. A *Senator* must be at least 30 years of age; must have been nine years a citizen of the United States; and must, when elected, be an inhabitant of the state for which he is chosen. The Vice President of the United States is President of the Senate; but has only a *casting vote*, in cases where the Senators are equally divided. The Senate chooses its other officers, and a President *pro tempore*, when necessary. It has judicial power only in cases of impeachment: but the power of impeaching officers of the general government, or arraigning them before the Senate, belongs solely to the House of Representatives.

Congress must assemble annually on the first Monday in December, unless it shall by law appoint some other day. Each house judges of the election and qualifications of its own members; and makes rules for its own proceedings, of which it is required to keep a journal. Neither house can adjourn for more than three days, nor change its place of session, without the consent of the other. Both senators and representatives are paid by law; and privileged from arrest in civil cases; but they are inhibited from appointment to any office which may have been created, or enhanced in value, during their term of service; nor can they hold any office from the executive, while they retain their seats. All bills for raising revenue, must originate in the House of Representatives; and every bill or resolution passed in Congress, except for adjournment, must be approved and signed by the President, before it can become a law, unless it be again passed by two-thirds of both houses, respectively.

The chief powers of Congress, are, to lay and collect taxes, duties, &c. for revenue; to pay the debts, and provide for the common defence and general welfare of the United States; to regulate commerce; to coin money, and punish counterfeiters; to establish post offices and post roads; to grant copyrights and patents; to constitute tribunals, inferior to the Supreme Court; to declare war; to raise and support armies; to provide and maintain a navy; to give efficiency to the militia; to exercise exclusive legislation over a district not more than ten miles square, as the seat of government, and over sites for forts and other public works, purchased with the consent of the states; to sell the public lands, and admit new states into the union; and to make any laws necessary for accomplishing these objects; subject to some restrictions, which we have no room here to mention.

§ 2. The *Executive power* is vested in a *President of the United States of America.* He holds his office during the term of four years; and together with the *Vice President*, chosen for the same term, is elected by *electors*, who are appointed by the states, in such manner as the respective legislatures may direct. The electors meet in their several states, and vote by ballot for a president and vice president; and their votes are transmitted to the president of the senate, who opens the certificates before both houses of Congress, and declares the result. If no person has a majority of the electoral votes for president, then one of the three highest candidates for that office is chosen to it, by the representatives, voting by states; each state having one vote. In the like case with regard to a vice president, he is chosen by the Senate; being one of the two highest candidates. The president and vice president, must have been natural born citizens, or else citizens of the United States at the time of the adoption of the Constitution: they must be at least 35 years of age; and must have resided 14 years within the United States. In case of the death, inability, or removal of the former, his office devolves on the latter.

The President is commander in chief of the army and navy, and of the militia, when called into the actual service of the United States. He has pardoning powers, except in cases of impeachment; and has power to make treaties, by and with the consent of two-thirds of the senators present in session. He appoints ambassadors, judges, and various other officers, subject to the senate's approval; and he may fill vacancies, which occur during the recess of the senate, by granting commissions, which shall expire at the end of the next senatorial session. He gives information and proposes measures to Congress; which body he may convene by proclamation; but he can adjourn it only when the houses disagree in regard to the time of adjournment. He receives foreign ministers; takes care that the laws be faithfully executed; and commissions all the officers of the United States, with whose appointment he is concerned. The president, vice president, and all civil officers of the United States, are removable from office, on impeachment by the house of representatives, and conviction by the senate, of high crimes or misdemeanors.

The distribution of the higher executive duties, not having been prescribed by the Constitution, has since been made by Acts of Congress. The *Secretaries of State, of the Treasury, of War*, and *of the Navy*, with the *Attorney General*, and the *Postmaster General*, are the immediate advisers of the President; corresponding to the ministry, in foreign governments; and together they constitute the *Cabinet.* The Department of State, the Treasury and War departments, and the office of Attorney General, were established in 1789: but the Navy department was not established, as a distinct one, until 1798; nor the Post Office department, until 1810.

§ 3. The *Judicial power* of the United States, is vested in a *Supreme Court*, and in such inferior courts as the Congress may from time to time ordain and establish. The *Judges*, of all the courts, hold their office during good behaviour; and their salary cannot be diminished during their continuance in office. The *Judicial* power extends to all cases, in law and equity, arising under the Constitution, Laws, or Treaties of the United States; to all cases affecting ambassadors, other public ministers, and consuls: to all cases of admiralty and maritime jurisdiction; to controversies, in which the United States are a party: to controversies between two or more states; between a state and citizens of another state; between citizens of different states; between citizens of the same state, claiming lands under grants of different states; and between a state or the citizens thereof, and foreign states, citizens, or subjects.

At present, the *Supreme Court* consists of one *Chief Justice*, and eight *Associate Justices:* and it holds one session annually at the seat of government; commencing on the second Monday in January. It has original jurisdiction in all cases affecting ambassadors, other public ministers, or consuls; and in all cases to which a state is a party. In all other cases, its jurisdiction is only appellate; that is, it may revise the decisions of the inferior courts, in cases legally brought before it, by writ of error, or appeal. Congress has created two inferior grades of courts, called *Circuit and District Courts;* besides *Territorial Courts*, for the territories belonging to the Union, but not yet raised to the rank of states. The United States are divided, for judicial purposes, into nine *circuits*, to each of which one of the Judges of the Supreme Court is assigned, as a Circuit Judge; and they are subdivided into 34 *districts*, to each of which a *District Judge* is appointed by the national executive. Each of these latter judges is required to hold a District Court, at least twice in each year: and in each district there is also held a Circuit Court, twice a year; in which the Circuit Judge for that circuit is associated with the District Judge for that district.

The Circuit Courts have original jurisdiction, in various civil causes, where the sum in controversy exceeds five hundred dollars; and they have also criminal jurisdiction, either exclusive, or concurrent with the district courts, over all crimes cognizable by the laws of the Union, except official misconduct. The District Courts have cognizance only of the less important cases; and when an appeal is made from them to the Circuit Court, the opinion of the Circuit Judge prevails; subject to a farther appeal to the Supreme Court. The trial of all crimes, except in cases of impeachment, must be by jury; and if they were committed within the limits of any state, the trial must take place therein. Treason is limited to levying war against the United States, or adhering to their enemies, giving them aid and comfort.

§ 4. On *State Rights and Restrictions*, we must here be very brief. The powers not delegated by the Constitution to the United States, nor prohibited by it to the states, are reserved to the states respectively, or to the people. No state can enter into any treaty, alliance, or confederation; grant letters of marque or reprisal; coin money; emit bills of credit; make any thing but specie a legal tender; pass any bill of attainder, or ex post facto law, or law impairing the obligation of contracts; or grant any title of nobility. No state can, without the consent of Congress, lay imposts, or duties on imports or exports, for the sake of revenue; nor can any state keep troops, or ships of war in time of peace; nor enter into any agreement or compact with another state, or with a foreign power; nor engage in war, unless actually invaded, or in such imminent danger as will not admit of delay.

Full faith and credit must be given, in each state, to the public acts, records, and judicial proceedings, of every other state; and the citizens of each state, are entitled to all the privileges and immunities of citizens in the several states. A person charged with crime, and fleeing from justice, to another state, must, on demand of the executive authority of the state from which he fled, be delivered up for trial therein. Persons held to service or labor in one state, under the laws thereof, and escaping into another, must be delivered up, on claim of the party to whom such service or labor is proved to be due. No new state can be formed, or erected, within the jurisdiction of any other state; nor can any state be formed by the junction of two or more states, or parts of states, without the consent of the legislatures of the states concerned, as well as of the congress. The United States guaranty, to every state in the union, a republican form of government; and must protect each of them against invasion, and, on due application, against domestic violence.

§ 5. The *Statutes and Treaties* of the United States, are so numerous, that we cannot here attempt even a summary of the most important. Among the *Statutes*, are laws establishing the executive departments, the judiciary system, the post-office system, the mint, the army and navy, and military academy; laws for collecting a revenue, and paying the national debt; for selling the public lands, and admitting new states into the Union; for establishing a protecting tariff and national bank; for granting patents to inventors, and copyrights to authors; for laying an embargo, and declaring war; for building government edifices, fortifications, and light-houses; and for improving harbors, and internal communications.* Among the *Treaties*, are those of Peace and Commerce with foreign states; sometimes defining boundaries, and international rights, and settling points of international law; and those for the purchase of territory, including Louisiana and Florida, and especially the lands of the Indians; often stipulating for their removal to more western regions. Notwithstanding all the Statutes and Treaties which have been made by the proper authorities, many minor points of law have been left to be settled by the national courts; and are only to be found embodied in the Reports of their decisions.

The *Martial Law* of the United States, to which the army and navy are subject, having been established by the national authorities, is connected, we think, more closely with Constitutional Law, than with the branch which succeeds it; but this is a subject which entirely transcends our limits. Of the Constitutions of the different states; which are very similar to that of the United States; we have no room here to speak. The *Governors* and *Legislatures* of the states correspond to the President and Congress of the United States; and the distribution of functions is in most of the states essentially uniform; differing only in the minor details.

* Some of these acts, and particularly those relating to a national bank, an embargo, and war, it will readily be understood, are no longer in force.

CHAPTER IV.

MUNICIPAL LAW.

The branch of Municipal Law, includes the rules of civil conduct, prescribed by the competent authorities of the various nations, for protecting the ordinary rights, and defining the duties, of their citizens. The name is from the Latin, *municipia*, or corporate towns; which, in ancient Rome, had their own peculiar codes of laws, distinct from those of the empire. It applies, therefore, with great propriety, to the laws of the different states, and of their corporate cities, in our own country; as distinguished from those of the United States. The Laws which govern the ordinary courts of justice in Great Britain, France, and other nations, must, in the present classification of knowledge, be placed under this head. Municipal Law, it will be seen, is that branch of Nomology which relates most immediately to the rights and obligations of individuals, in their private capacity. Hence, a knowledge of its provisions is more or less important to every citizen, as a guide to the discharge of his civil duties.

The earliest municipal code of laws on record, is that of the Jews, promulgated by Moses, under divine authority; 1491 to 1451, B. C. Its morals are still obligatory; though its ceremonials have passed away. The Laws of Lycurgus, established in Sparta, 884 B. C. were adapted to a nation of warriors, supported by their slaves. Those of Draco, imposed on Athens, 623 B. C., famous only for their severity, were succeeded by the milder code of Solon, 594 B. C., which favored an aristocratic and commercial system of administration. Under these laws, public offences were tried before the *Areopagus*, and higher courts; but private suits were prosecuted before new tribunals, the members of which were chosen by lot from among the whole people. The Areopagus was also empowered to punish vagabonds, and to watch over the public morals, and the rigorous observance of the laws.

The first Roman Laws which we can here notice, were those of the *Twelve Tables*, compiled by the Decemviri, 450 B. C. They were amended, and extended, by the successive Prætors, acting as judges; whose edicts, collected by Julianus, under Adrian, A. D. 131, were pronounced perpetual. The imperial constitutions, or ordinances, were first digested and codified under *Theodosius* II., A. D. 438; and finally at Byzantium, by Tribonian and others, under *Justinian*, A. D. 533. Tribonian prepared the *Institutes*, or elementary laws; the *Pandects*, or digests of the opinions of eminent lawyers; and the *Codex*, or *new code*, of revised imperial constitutions; to which were afterwards added the *Novels*, or new constitutions, partly subsequent to the time of Justinian: the whole constituting the *corpus juris civilis*, or Roman Civil Law. This system of laws was for a time lost, in the confusion of the dark ages; but a copy of the pandects, found at Amalfi, in Italy, in 1137, led to the codification of the Papal Canon Law, commencing with the labors of Gratian, about 1151; and to the introduction of the Roman law in the various catholic states of Europe.

The French laws, were first generally reduced to writing, under Charles VII., in 1453; and they were systematized by Louis XIV.; who promulgated ordinances, on the Civil process, in 1667; on the Criminal process, in 1670; on Commercial law, in 1673; on Forest law, in 1669; on the Marine, in 1681; and on Ecclesiastical law, in 1695. These laws were greatly simplified, in the Codes prepared under the Emperor Napoleon, which are still occasionally called by his name. The *Civil Code*, or general law of the country, was elaborated in 1805; and is emphatically styled the "*Code Napoleon;*" as he assisted personally in preparing it. The Code of Civil Procedure, was published in 1806; that of Criminal Procedure, in 1808; and the Penal Code in 1810. These codes, with that of *Commerce*, published in 1807, are often termed the Five Codes; and are still the basis of French Municipal Law. The *Constitutio Carolina*, was the basis of the Criminal Law of Germany. It was first sketched by the emperor Maximilian, and proposed to the Diet at Worms, in 1521; but revised and augmented at the Diet of Spire, in 1529; and published in the form of a law, in 1532, under Charles V.; from whom it took its name.

In England, an excellent municipal code was established by Alfred the Great, A. D. 886: which was the basis of the English Common Law. This was greatly modified by the *Feudal Laws*, introduced by William the Conqueror, in 1070; by which the nobles held their land as the gift of the king, and dealt it out to their *serfs* or *vassals*, who were the disfranchised Saxons, or the Norman soldiers. Fealty, and service, were the conditions by which the *fiefs* or feudal lands were thus held. This system was gradually superseded by the changes which we have referred to, in speaking of the English Constitution; (p. 110); by which popular liberty has been partially restored. The English Municipal Law is derived, then, from the ancient common law, the feudal law, the Roman civil law, and the ecclesiastical law, partly blended together, and more or less modified by acts of Parliament; the whole forming a complicated and heterogeneous system. The character of the English law has been gradually becoming milder; and many offences which were formerly capital, are now punished by transportation or imprisonment.

The Municipal Law of our own country, is based on that of England; but variously modified by the statutes of the different states; in some of which, systematic codes have been prepared; and in all of which, we think such codes would be beneficial. Cases not provided for by statutes, are generally decided by reference to the common law, or to the principles of natural law and justice. The Judicial power of the states, is vested in various courts; one of which is usually styled *Supreme;* and the others are called Circuit Courts, District Courts, Courts of Appeals, Courts of Common Pleas, County Courts, Probate Courts, Justices' Courts, and in cities, Municipal, Mayor's, or Police Courts; according as the respective states have provided. Each state has also made provision for proceedings in Equity; by vesting Chancery powers in a Chancellor, in the Senate, or other high authorities. The *Civil Code of Louisiana*, which was digested from all the heterogeneous pre-existing laws, chiefly, we believe, by the labors of Mr. Livingston, and promulgated in 1824, has been highly praised as a model of its kind, and a specimen of the benefits of a judicious codification.

We proceed to treat of Municipal Law, on points which are common to most of the states, under the heads of Laws of Persons; Laws of Property; Laws of Crimes; and Laws of Procedure.

§ 1. The *Laws of Persons*, or, as they are termed by Blackstone, the Rights of Persons, arise from their relations to the government, or to each other; and hence are either *official* or *private*. Of official rights and duties, we have already spoken, as far as we had room, under the branch of Constitutional Law. In their private rights, persons are regarded as either citizens, or aliens; males or females; adults or minors; sane or insane; masters or servants; principals or agents; and as either *natural* or *artificial persons;* the latter meaning corporations or partnerships. We shall first speak of the laws concerning *domestic relations;* or those of husband and wife; parent and child; guardian and ward; and master and servant: and afterwards treat of *business relations*, which are more public in their character.

Females, in this country, have no political rights, as of voting, or holding public offices; but, while single, they have the same legal rights as males. By *marriage*, their legal rights pass mostly to the husband; who, with his wife, is considered as one legal person. He can dispose of her personal, but not of her real property, or land, without her voluntary consent; and he becomes liable for her support, and for her debts, whether contracted before or after marriage. Marriage is considered, in law, only as a civil contract; but as one of the highest importance and obligation. The marriage of idiots, or lunatics, or of persons nearly related, is generally forbidden by the civil law. *Parents* are the legal guardians of their children, whom the law regards as their servants. *Guardians* of idiots or insane persons are usually appointed over them; but guardians of orphan minors are more frequently chosen by themselves, to manage their affairs, under proper restrictions. *Apprentices* are temporary servants, bound to their masters for a certain term, by an *indenture*, or form of law; and held to faithful service, in return for the art which they acquire.

Artificial persons, are either corporations, or partnerships. A *corporation*, is a body of men incorporated by statute or charter, for certain express purposes; as banking or manufacturing. It may hold property, and be subject to obligations, like individuals. Corporations are usually managed by responsible *trustees* or *directors;* and they are public or private, perpetual or temporary, according to their objects and charters; their seal, and the signatures of their officers, being the evidence of their obligations. *Partnerships*, are associations of two or more persons, by contract, for business or other specified purposes. Each partner is a legal agent for the whole firm, within its proper scope, and is liable for its debts and obligations. *Executors*, and *administrators*, are persons appointed or chosen to settle the estates of persons deceased.

§ 2. The *Laws of Property*, are included by Blackstone under the title, Rights of Things; a term borrowed from the Roman law. *Property*, is any thing deemed valuable, which can be exclusively owned by one person; whether in actual possession, or in expectancy, as when secured by contracts, or expected by inheritance. *Personal property*, or *personalty*, includes moveable articles, called goods and chattels; but *Real property*, or *realty*, includes things fixed and immoveable, and hence said to be tangible; as lands, tenements, and hereditaments. The word *tenement*, comprehends not only land itself, but the fixtures upon it, and privileges connected with it. Lands are termed *corporeal hereditaments;* while easements, or privileges, which may be held distinct from the land itself, as right of way, right of rivers, commons, and the like, are termed *incorporeal hereditaments*. The right of real property, in our own country, rests originally on first possession, or purchase from the aborigines; and it is generally held *allodially*, that is, by independent right; and not, as it is often held in Europe, by *feudal tenure*.

An *Estate*, is an interest in any real property. An estate in *possession*, is one actually held: but an estate in *reversion*, is one which by law will revert to the person claiming it, after the temporary right of some other person to it has expired. An estate in *remainder*, is one expressly granted to the expectant, after the termination of some previous grant or particular estate in the same. A *freehold estate*, is one held in fee simple, subject to no conditions or contingencies; and an estate *in fee*, is one which, at the death of its owner, if not otherwise disposed of by him, descends to his heirs. An estate *for life*, is one terminating with the life of the tenant, or of some other person; the tenant holding it either for life, or for, that is, during another's life. An estate *for years*, is one secured to the tenant, by lease, for a certain period. An estate *tail* or *entailed*, is one which must revert to the grantor, in case the grantee should not, at his decease, leave heirs as prescribed: and an estate *in trust*, is one conveyed to a trustee or trustees, for the benefit or use of a third party, called the beneficiary, or *cestui que trust*. An estate *in severalty*, is one entirely owned by a single person; but an estate in *joint tenancy*, *in coparcenary*, or *in common*, has two or more owners; with certain differences implied by these several terms.

A *title*, which is the evidence of right to an estate, may be acquired by occupancy for a sufficient time; by marriage; by descent or inheritance; by devise or bequest, that is, by the *will* of another; and by *deed* of purchase, or by mortgage, with failure of redemption. A *mortgage* is the grant or conveyance of an estate in fee, as security for the payment of money; with the condition that if the money be duly paid, the grant shall thereby become void. A *contract*, is an agreement between two or more legal persons, respectively to do, or not to do a certain thing or things, for a consideration therein specified. Such are indentures, deeds, bonds, mortgages, policies of insurance, and promissory notes. A *promise*, differs from a contract, in having no specified consideration or inducement. A *will*, or testament, is a voluntary instrument, disposing of the testator's property, after his decease.

§ 3. The *Laws of Crimes*, are included in the first parts of Blackstone's Books on Private, and Public Wrongs. Crimes may be classed either as directly against the public welfare; or against private persons; or against private property. In the first class may be mentioned treason, piracy; insurrection, riots, or affrays; resisting the execution of the law; obstructing or injuring public works, as highways; creating public nuisances, by contaminating the air, or water, and the like; gambling, profanity, and other violations of public morals; and all similar offences. *Perjury*, or false swearing; and *bribery*, which is hiring or being hired to pervert justice; including *embracery*, or an attempt to corrupt or unjustly influence a jury; are usually both public and private wrongs. Crimes against private persons, are such as *murder*, or inflicting death unlawfully and intentionally; *manslaughter*, or doing the same criminally, though without direct intention; injury to *personal safety*, as assaulting, maiming, stabbing, shooting, or poisoning; injury to *personal liberty*, as seizing or kidnapping; injury to *personal character*, as slander, or libelling; and injury to *personal purity*, as bigamy, adultery, and the like. Crimes against private property, are *arson*, or setting fire intentionally to dwellings or buildings contiguous to them; and, of like character, setting fire to, or destroying other property; also *burglary*, or house-breaking by night; and, analogous to it, other house-breaking; also *robbery*, or forcibly taking away property; and *larceny*, or stealing; together with forgery, counterfeiting, fraudulent conveyances, swindling, and the like.

Of the particular *punishments*, which, for these and other offences, vary in the different states, we have not sufficient room to speak particularly. The punishments generally in use, are *capital punishment*, or the infliction of death, usually by hanging; next *imprisonment*, either in penitentiaries, which are state prisons, or in jails, which are county prisons; and lastly, *fines* or amercements, exacting the payment of money to the state, the informer, or prosecutor; or *damages*, awarded to the injured party. *Corporal punishments*, such as whipping, branding, and cropping, are now seldom inflicted; *solitary confinement* being generally regarded as the punishment best calculated to reform the offender. On the theory of punishments we have already briefly spoken, under the head of Political Philosophy. (p. 103.)

§ 4. The *Laws of Procedure*, include the latter parts of Blackstone's Books on Private and Public Wrongs; relating to the mode of redressing injuries, or of punishing crimes. Proceedings in Courts of Justice, are styled either civil or criminal, according as they relate to the former or the latter objects. The violation of any legal right, produces an injury or *wrong*. If it be a dangerous one to society, the public authorities take cognizance of it, as a public crime; otherwise it is regarded as a private wrong, for which the injured party has a civil remedy; whether it relates to his lands, goods, person, or reputation. The redress usually sought, is the recovery, either of some specific article of property, or of damages, to compensate for some injury sustained. An *action* or *suit*, is the whole course of legal proceedings, to obtain redress for a private wrong. The party who commences it, or sues, is called the *plaintiff;* the other, the *defendant*. An action of *debt*, is one for the recovery of a debt; an action of *covenant*, is for breach of a sealed contract; and one of *assumpsit*, is for breach of a contract not sealed; these being all termed actions of *contract*. Among actions of *tort*, are those of *trespass*, for violent or forcible injury to person or property; of *trover*, for the recovery of goods stolen or wrongfully taken; of *detinue*, or of *replevin*, for obtaining goods wrongfully withheld; and of *ejectment*, for recovering possession of real property. An action *on the case*, or of *trespass on the case*, is for any injury to the person, property, health, reputation, or comfort of the complaining party, inflicted without actual or constructive force.

The term *process*, includes all writs and orders, issued by courts to their executive officers, in the course of judicial proceedings. A *summons*, is a writ, commanding the sheriff or constable to summon the defendant; and a *capias*, requires him to take the defendant, and bring him into court. In some cases, the defendant is permitted to give *bail*, or security, in a certain sum of money, for his appearance. A writ of *attachment*, is one for the seizure of property. The *declaration* or count, is the plaintiff's statement of the cause of action; to which the defendant may either *demur;* maintaining that there is no sufficient cause of action, or that it is not brought in legal form; or he may *plead* in *abatement*, against the jurisdiction of the court, the identity of the parties, or the like; or finally, he may plead *in bar*, that is in *traverse*, denying the allegations of the plaintiff entirely. After this may come the *evidence* of witnesses; the *arguments* of counsel; the *charge* of the judge to the jury; the *verdict* of the jury; and the *judgment* of the court; enforced by a writ of *execution*, unless the cause be removed to a higher court.

CHAPTER V.

POLITICAL ECONOMY.

Political Economy, is that branch of knowledge which investigates the nature, sources, and proper uses of national wealth. The name is from the Greek, πολις, a state; and οικονομια, housekeeping: this latter term being derived from the words οικος, a house; and νομος, law. In many respects, Political Economy may be said to bear the same relation to a state, which Domestic Economy does to a single family: for, although professedly relating to the wealth of nations, it indirectly examines many points of comfort and well-being, which are connected with the acquisition, and expenditure of wealth. Its connection with legislation and government, and its subserviency thereto, will at once be perceived from its definition; while the merchant, and even the moralist may derive important lessons from a knowledge of its facts and principles.

The first regular system of Political Economy, appears to have been that adopted by Colbert, under Louis XIV., and promulgated in the French Tariff of 1664. It has since been called the *Mercantile System;* as it maintained that the chief source of wealth is foreign trade; the value of which it supposed to be measured by the *balance of trade*, or excess of exports over imports: this balance being usually made up in specie. The doctrine thus promulgated has also been termed *Colbertism;* from the name of its author. This theory was followed by the *Agricultural* (or Physiocratic) *System* of Quesnay; who published, in 1758, his "*Tableau Economique*," maintaining that the earth is the only source of wealth; and that all taxes should be levied on land, or its produce. Adam Smith, in his celebrated treatise on the "*Wealth of Nations*," published in 1776, maintained that all wealth consists of *material* products, deriving their value solely from the labor bestowed upon them; while mental labor and acquisition he overlooked, as unproductive. His system was introduced into France by J. B. Say; the first edition of whose work, printed in 1802, was suppressed by the order of Bonaparte. Say was the first writer who recognised the existence of mental wealth, consisting of acquired skill, or learning; but of this, his system made no practical application. That such wealth really constitutes *capital*, as much so as land or buildings, and like them, is productive of more wealth, was first proved and incorporated in this science, we believe, by our countryman, Prof. Vethake.

In 1817, Ricardo published his "*Principles of Political Economy and Taxation*," in which he differed from Adam Smith, in maintaining that a rise of wages occasions a fall of profits, and hence may take place without causing a rise in prices; as also, that prices of products do not depend upon rent; and that as population increases, profits decrease, because inferior land must then be cultivated. Rev. T. R. Malthus has written exclusively on *Population;* the increase of which he considers as limited by the means of *subsistence*, referring particularly to food. Prof. Vethake, in his recent, able treatise on this science, has shown, we think conclusively, that this increase is limited, not by the means of subsistence only, but by the means of *support*, or the amount of necessaries and luxuries actually possessed, in comparison with the amount desired. We proceed to treat of Political Economy under the heads of Production, Distribution, Exchanges, and Consumption, of Wealth.

§ 1. The *Production of Wealth*, is generally the result of *labor;* that is of effort or exertion, physical or mental, directed to this object. *Wealth* or property, is that which can be appropriated by an individual or society, and made to have an *exchangeable value.* Wealth always possesses *utility*, technically speaking; but there are objects which possess utility, without constituting wealth; as air and light. The term utility, it will be seen, is here applied to many things, which being in demand among men, have an exchangeable value; although they may, like ardent spirits, be really injurious to the best interests of society. This principle is distinctly recognised by the political economist; who terms such articles useful, only because they will command useful articles in exchange. By *national* *wealth*, is meant the whole wealth of a nation, whether in the hands of individuals or of the government; and hence a general increase of private wealth is an increase of national.

The objects, or purposes, of labor, are either *agricultural*, to obtain the raw materials or produce; or *manufacturing*, to prepare these materials for use; or *commercial*, to transport them to the places where they are wanted. Thus, the farmer, miner and fisherman; the manufacturer and mechanic; and the merchant and navigator reciprocally aid each other. *Capital*, is wealth saved, and applied to produce more wealth, hence said to be reproductive. *Fixed* capital, is that which is comparatively durable; as houses, mills and the like; while *circulating capital*, is relatively transient or perishable, as wages, provisions, and materials. Writers have seen fit to distinguish between capital, which is the produce of labor, and what may be termed *rental*, which is the produce of nature, simply appropriated by individuals; as land or mill seats. Thus labor produces *wages;* capital produces *interest;* and rental produces *true rent*, meaning that which is received for the use of land, independently of its improvements. The excess of produce over the wages, interest, and true rent, is the reward of the skill, which is intellectual capital, and of the mental labor of the producer.

The production of wealth is generally increased by the *subdivision of labor;* assigning to each individual that work which from skill or habit he can best perform, and to each region or country its most available produce. The amount of production is also increased by means of inventions and improvements in the arts; which the subdivision of labor tends greatly to multiply. *Monopolies* or exclusive privileges, should be granted only as a reward for such improvements; as in the case of patents, and copyrights, which serve as stimulants to mental labor and ingenuity. Regulating and prohibitory duties, or *Tariffs*, tend to restrain commercial enterprise, and to elevate the prices of the protected articles. Hence they are justifiable only on a limited scale, and for some great national object. In general, the production of wealth will be the greatest, where each person is left free to choose any lawful pursuit; and permitted to enjoy the full fruit of his labors.

§ 2. The *Distribution of Wealth*, is necessarily regulated by the relations of the demand and supply of commodities; which are always tending to a standard or medium, for each article and place. This principle alone decides how much the *rentalist*, who rented the land, the *capitalist*, who loaned the requisite money, and the *laborer*, who aided in their application, shall respectively receive from the *producer*. Capital and rental, being absolutely necessary, for many productions, in order to render labor available, become marketable objects, which are to be returned good, and with a price paid for their use. And as the relative quantities of labor, capital, and rental, in any country, or in the world, can vary but slowly, their real value is comparatively constant; though their nominal value fluctuates with that of money. Rent is said to have no influence upon the price of commodities; it being the *effect* of a rise of prices, but not the cause. The natural price of raw produce, is the cost of its production from land which pays no rent. As the demand increases, and new land is cultivated, the increased cost of produce therefrom, causes a rise of the rent on lands previously cultivated. Capital loaned to individuals, sometimes commands a high rate of interest, including a premium paid for the risk of its loss. It is generally first applied to produce such objects as are in permanent demand; and more cautiously to objects of fluctuating value; especially if in such cases it would be transferred with difficulty.

As countries advance in wealth and technical skill, the value of rent generally increases; while that of interest and wages comparatively declines. Wages must vary, not only with the amount of labor, and the demand for it, but with its nature, as being more or less productive, pleasant, or honorable. It is clear that the physician, who cures the farmer's illness; the clergyman, who labors for his eternal welfare; the lawyer, who pleads his cause; the judge, who sustains his rights; and the soldier, who defends them; should all share in his earnings, as well as his landlord and merchant; each in proportion to his services, as custom and agreement may decide: nor should the government interfere, unless appealed to by some aggrieved party. *Usury laws*, or those restricting the rate of interest, are of doubtful policy, and, we think, should apply only in cases where no special agreement was made between the parties. No government has a right to take, by taxation or otherwise, any more for itself, than is necessary for its adequate support, and for its legitimate objects. Among these, we would include such public improvements as cannot be effected by individual efforts; or by corporations duly restricted in their powers and profits, and under reasonable legislative control.

§ 3. *Exchanges of Wealth*, including its transportation to places where it is wanted, may increase its actual value, though not its quantity. The *exchangeable value* of any commodity depends not only on its intrinsic value, including durability, but on the supply and demand for it, in comparison with other articles. The *natural price*, or real value, is the actual cost of producing and transporting it; but the *market price*, or nominal value, depends also upon the relative value of money. When the relative value of money varies, the market prices of all other articles, so far as they are affected thereby, rise or fall alike, unless it be that articles of luxury fluctuate the most.

Money, is that commodity which is most frequently exchanged for every other; that is, the *medium* of exchanges. Gold and silver, from their durability, rarity, and convenience, have become the standard money of the world. They are coined, to save the necessity of frequently weighing and assaying them; the government stamp attesting their quantity and purity; and hence slightly increasing their value. *Bank notes* derive their value from their convertibility into coin; and hence they are at par, only so long as they are payable in specie, on demand, at the counter of the bank which owes them; otherwise they are depreciated, however solvent the bank may eventually be found. The value of money fluctuates with its quantity. Were half the money in the world to be annihilated, the remainder would be nearly doubled in value; and the nominal prices of all other commodities would rise in nearly the same proportion. It will be readily seen that all fluctuations in the value of money are injurious either to debtors or creditors.

Banks are of three kinds; though in our own country the three are generally united. Banks of *deposite*, receive money for safe keeping, and repay it to the order of the creditor; receiving compensation therefor, by the use of the money. Banks of *discount*, lend money, on security; but discount the notes which they receive; that is deduct so much from the money which they lend, as will be equivalent to interest thereon. Banks of *circulation*, issue notes of their own, usually payable on demand; and these bank notes circulate as money, on governmental authority. But the more abundant they become, the less is their real value; and when a sudden demand for specie arises, the banks greatly diminishing their discounts and circulation, greatly increase the fluctuations in the quantity and value of money. We think that banks are useful, under proper restrictions, when their number and circulation are sufficiently limited: and that, even when they are too numerous, their number should not be diminished too rapidly or suddenly, lest injurious fluctuations should ensue. It is an important question whether stockholders, and especially directors, should not be placed under heavier liabilities; to guard against abuses and failure of these institutions.

§ 4. *Consumption of Wealth*, is said to be productive, or unproductive, according as it generates more wealth, or not. Strictly speaking, the former is not a consumption of wealth, but only of certain commodities, for the sake of producing others, or a greater quantity of the same: and wealth in general is the surplus of production over consumption. The distinction between *necessary* and *luxurious* consumption, is quite indefinite and arbitrary; as what some individuals might deem necessary, to themselves, others, of different habits, might deem luxurious. Though it is desirable that the private consumption of wealth should be less than the production, yet this is a point in which the government has no right to interfere, unless public prosperity and virtue are at stake. *Sumptuary laws*, regulating private expenditure, are not only odious, but they discourage production.

A portion of the national wealth is necessarily consumed by the government, in accomplishing its important objects; and this portion it derives by some mode of taxation. A *poll tax*, or tax on persons, if it be general, exacts as much from the poor as from the rich; though the latter need protection for their property, as well as their persons, and should therefore pay more in proportion to their numbers. A *land tax*, or tax on lands, might have been just originally; as it would in time be felt alike by all men, in the general rise of prices; but its present introduction, would at first burthen the landholders unjustly, unless the change were very gradual. An *excise*, or internal tax on commodities, is difficult to collect; and a tax on exports is felt severely by merchants, who wait a long time before receiving returns therefrom. A general tax on both persons and property would probably be the most just; but a tax on imports, under the name of *duties* or *customs*, is the most convenient to collect, and hence resorted to by most nations.

A tax for the support of religion, we believe to be unnecessary; as the voluntary contributions of piety and philanthropy are its meet support: but a tax for the support of the disabled poor, is dictated by humanity itself; though to discourage pauperism, those who are able to work should be supplied with work and kept employed. A tax in behalf of elementary education, is, we think, of fundamental importance; as tending to promote good order; to prevent poverty, vice, and crime; and to increase the amount of human happiness, by raising the scale of intellectual refinement and enjoyment. This is the best, and, perhaps, the only remedy that can be recommended, to prevent the excessive increase of population, which takes place chiefly among the poorer and less enlightened classes of society.

IV. DEPARTMENT:

THEOLOGY.

In the Department of Theology, we include the study of all Religions, whether of heathen or Christian nations. The name is derived from the Greek, Θεος, God; and λογος, a discourse; as it comprehends the study of the Deity, his laws and revelations, and our duty towards him; all of which is sometimes designated as the study of *Divinity*. It may be properly subdivided into the branches of Paganism, Mohamedanism, Judaism and Christianity: to each of which, the term Theology has been applied, by believers therein. We place this department last, in the province of Psychonomy; because we regard it as the highest and noblest of human studies. But it should not be forgotten that a theoretical knowledge even of Theology, may, like the sunbeam on the mountain glacier, only dazzle to blind; while, unless the heart is warmed with vital piety, the coldness and barrenness of eternal death may reign within.

The term *Religion*, is from the Latin *religio*, a sacred obligation; and it is nearly synonymous with *piety*, signifying love to God, obedience to his laws, and submission to his will. By *Natural Religion*, is meant that knowledge and veneration of the Deity, which was attainable by the heathen nations, or by human reason, unassisted by revelation. The fact that every nation, however barbarous, has some object of worship, shows that piety is natural to man, although it is so often corrupted by debasing passions; and that some religion is necessary to satisfy our better nature. The necessity of a *First Cause*, to create and govern the world; the existence of moral good and evil; and the doctrine of future rewards and punishments; these are perhaps the chief truths which were discoverable by human reason; and which have accordingly been more or less known to heathen nations.

Revealed Religion, comprehends, besides the doctrines of Natural Religion, many truths which were beyond the reach of human reason, though not contradictory thereto; and for a knowledge of which we are indebted directly to divine *Revelation*. The unity and spirituality of the Deity, may have been discoverable by the light of reason; though more probably made known by traditions, handed down from the early patriarchs, to the migrating families of their descendants. But the peculiar doctrines of the Gospel; such as the fall and condemnation of mankind; the incarnation, and atonement of our Saviour; and the mission of the Holy Spirit; in short, the whole gospel scheme of salvation; these are truths which revelation alone could unfold, to cheer the saddening human heart. While, therefore, we deplore the weakness of our nature, as manifested by our own personal errors, we may rejoice in the goodness and mercy of our Creator; both in providing a way for our salvation, and in revealing that way to our knowledge, so clearly, that all who truly seek it may find it, and attain to light and life eternal.

The *Revelation* of which we speak, and the only one which we recognize to be such, is the *Bible*, comprising the Old and New Testaments. True it is that human reason has been exercised in proving the truth of this Revelation, and ascertaining its meaning: but this detracts nothing from the excellence or importance of the Holy Scriptures. It has been beautifully said, that "reason is the compass by which we steer our course; and revelation is the polar star, by which we correct its variations." The value of revelation appears from this, that by its aid, the youth of the present day, may know more of religion and morality, than the wisest of the heathen philosophers; although many of them employed a long life in studying the mysteries of their origin and their destiny. In illustration of this point, we may here add that Socrates, the worthiest of them all, deemed it necessary "that an instructor should be sent from heaven, with special authority to reveal and enforce the duty of man."

Engrossed as we are by the cares, the pursuits, and the pleasures of this life, who can realize the wondrous realities that await us in a future state of being! Or who can prepare for that state, as he would wish to have done, when the lamp of life shall flicker in its socket, the world recede like a dreamy shadow, and the soul wing its flight to eternity! Shall we rise, upborne on angels' wings, to the mansions of a Saviour's love, there to serve Him who shed his precious blood to save us, and enjoy His blissful presence forever? Or will our own conscious guilt, in sinning against such mercy, and neglecting so great salvation, drag us down, self-condemned, to the gulf of eternal perdition, of darkness and despair? It is well to think of these things, and well to choose our course; lest, drifting aimless on life's uncertain sea, the storm overtake us, and bury our frail bark beneath the unfathomable waters. How inexpressibly awful, and affecting, is that saddest of all shipwrecks, the shipwreck of the soul!

There are many questions relating to the Divine government, and to the different orders of being, which the Bible leaves, and doubtless wisely leaves, enveloped in mystery. Such are the origin of physical and moral evil; the relation of man's free will to God's foreknowledge; the nature of the soul, and of spiritual existence; the particular duties and enjoyments of angelic beings; the inhabitants, if such there are, of the starry worlds around us; and other similar themes, which will readily occur to the reflecting mind. In reference to these subjects, we can only offer the suggestion, that the world which we inhabit, and the races which inhabit it, constitute but an infinitely small portion of the works and creatures of Providence; and that our apostacy may serve as a warning to other orders of being, by which they are kept from rebellion and from woe. It must have been so permitted, by the Creator, or it could not so have been; but the Divine purposes therein, it were impious for us to impugn, as it is superfluous for us to know. Suffice it, that the Bible can impart all the knowledge which is necessary for our salvation; and more than we are capable of acquiring in our present probationary state. Its excellence, however, can only be realized by comparing it with the systems of false religion, which have enslaved or still enslave a large portion of our race.

We proceed, therefore, to treat first of Paganism and Mohamedanism; and, after these, of Judaism, considering it as introductory to Christianity; which last we shall then be prepared to examine from a higher point of view.

CHAPTER I.

PAGANISM.

In the branch of Paganism, we include all the fabulous and polytheistic systems of Religion which have prevailed in pagan or heathen nations; whether they worship the heavenly bodies, or men, beasts, or idols. The name is derived from the Latin, *paganus*, a peasant or villager; and was first applied in the time of Constantine the Great; because, when he forbade the heathen worship in the cities of the Roman empire, those who still adhered to it, retired to the villages and fields to practise it. Paganism comprehends the greater part of *Mythology*, properly so called, that is, the study of the fables of ancient times; the name Mythology being derived from the Greek μυθος, a fable. Some of these fables were purely historical, philosophical or allegorical; but the greater part, even of these, were more or less closely connected with systems of religion.

The term Mythology, was first applied to the Greek and Roman systems of fables, or Classic Mythology; but it has since been extended to those of heathen nations generally. The Romans borrowed their system from the Greeks; and it is now well ascertained that the Greeks derived theirs from the Egyptians and Phœnicians. All these systems, as also those of the Persians, Hindoos, Boodhists, Scandinavians, and American Indians, alike bear traces of the Scripture History, and the ancient religion of the patriarchs; from which, doubtless, they have all been derived, with various degrees of corruption. This, we think, has been conclusively shown by various writers, particularly Bryant and Faber; the former of whom traces the ancient Mythology back to the Deluge, and the deification of Noah and his three sons, under the names of Chronos or Saturn and his offspring: while the latter, moreover, detects in it various traditions concerning Adam, and the antediluvian ages.

Faber supposes the first stage of idolatry to have been the worship of some representative of the Supreme Being, in his stead; as the sun, the elements, or some favored mortal. From this, the transition would be easy to the worship of idols and beasts, considered as personifications of some divine principle, and as sources of good or evil to mankind. The human passions even, and moral virtues were ranked as deities; and temples erected for their worship. In process of time, heroes, and benefactors, or even destroyers of mankind, their deeds being magnified by the dim light of tradition, came to be deified, as gods, or demigods, and objects of adoration. The doctrine of *Polytheism*, or the belief of many gods, being thus disseminated, their number increased surprizingly; the gods of one nation being adopted by another, and frequently their history and attributes mingled in interminable confusion. Hence, Mythology is a labyrinth, now dilapidated by the hand of time, and which probably can never be perfectly explored.

We proceed to treat of Paganism, under the heads of Egyptian, Aramæan, Classic, Hindoo, Scandinavian, and Ind-American Mythology.

§ 1. The *Egyptian Mythology*, is partly illustrated by ancient classic writers, and partly by the recent discoveries concerning Hieroglyphics; to which we have already alluded. (p. 49). The ancient Egyptians believed the world to have been hatched from an immense egg of matter, by the animating and genial power of the *demiurgos*, or Supreme Deity. They divided the world into three zones; the first being the earth; the second the air, in which the souls of the dead were subjected to transient probation or punishment, before entering the third zone, that of eternal rest. They believed in the transmigration of souls; and this probably led to their worship of various animals, as incarnations of men or gods. The regions of the dead they called *Amenti;* and Elisout was the name of a cemetery, beyond the lake Acherusia (or Acharejish); whence came the Grecian fable of the Elysian Fields; for *Elisout*, in Coptic, signifies rest; and *Charon*, a ferryman.

The earliest gods of Egypt, appear to have been Chnoub, Neith, and Phtha; different personifications of the Supreme Being. *Chnoub*, Chnouph, or Cneph, (Noub, Nouf, Nouv, or Nef), was the personification of goodness; and the emblem of paternity; represented by a ram's head or horns. He was regarded as the demiurgos or creator, and afterwards confounded with Amoun, and Jupiter. *Neith*, corresponding nearly to Minerva, was the personification of wisdom; and was once represented by a vulture, as the emblem of maternity; which symbol was afterwards applied to Isis. *Phtha* or Phta, corresponding nearly to Vulcan, was regarded by some as the first creator, but by others as the son of Chnoub. He was rather a personification of solar light and heat; being represented by the sun, or by a hawk, or having a hawk's head on a human body. *Sate*, corresponding nearly to Juno, was styled daughter of Phtha, and queen of the three regions; and was represented by the sacred *pshent*, or head dress with two horns. *Sme*, answering to Themis, was represented as wearing a feather on her head, or symbolically by a serpent; her province being to lead souls to judgment.

In later times, the sun was worshipped under the names of *Phré* or *Re*, (or Ri), corresponding to Apollo; and still later, as *Osiris*, corresponding to Pluto, the ruler of the infernal regions, or the sun after its setting. In like manner, the moon was worshipped, first under the name of *Ioh;* and afterwards as *Isis*, the wife of Osiris, corresponding to Proserpina, the wife of Pluto. Osiris has been considered by some writers as representing the river Nile; an honor which belongs rather to *Serapis;* while Isis they have regarded as the earth, corresponding to Ceres: and the marriage of Osiris and Isis, they supposed to typify the inundations of the Nile, by which Egypt was fertilized. The evil deity of the Egyptians was *Typhon,* the brother of Osiris, who murdered him, for the sake of his kingdom; and this fable is supposed to typify the South Wind, drying up the Nile. *Nephthys* was the twin sister of Typhon, and became his wife.

Typhon was slain by *Horus,* (or Arueri), the son of Osiris and Isis, and one of the infernal judges. Isis, in seeking her husband's mangled remains, was aided by *Anubis;* who was a son of Osiris and Nephthys, and another of the infernal judges, usually represented with a dog's head. *Apis,* represented by a bull, was the third judge; and the Egyptians worshipped two other sacred bulls, Mnevis, and Onuphis. *Pooh* they worshipped as ruler of the regions of the air; and *Thoth* as his assistant, who drove unworthy souls back to degraded bodies; the Mercurius Psychopompus, as well as Trismegistus, of the Romans. As *Horus,* though the son of Osiris and Isis also represented the sun; so *Bubastis,* although their daughter, also typified the moon, corresponding to Luna, or rather to Lucina.

§ 2. Under the head of *Aramaean Mythology,* we comprehend that of the Chaldeans, Assyrians, Persians, Syrians, Phœnicians and Canaanites; the name being derived from Aram, from whom the Chaldeans and Syrians were descended. Their Mythology was doubtless as ancient as the Egyptian; similarly introduced; and, though less complicated, it was still extensive. But as little is known of it, and that little is of minor interest, we shall here speak of it very briefly. Its origin is attributed to Cush, the eldest son of Ham; but it must have soon spread among the nations; and its natural result was the impious attempt to build the tower of Babel. That tower afterwards became the unholy temple of the idol god *Bel* or *Baal,* (or Paal, or Pul), who is regarded as a deification of Belus, and a personification of the sun. The other chief deity of the Babylonians was the infamous *Mylitta,* the goddess of licentiousness. The ancient Persians worshipped several gods, particularly *Mithras,* (Mithros, or Mitras), the sun, which was afterwards worshipped by the Gauls. They adored *Oromastes,* or Oromazus, as the spirit of light, and of goodness; and *Arimanes,* as the spirit of darkness and evil. The sect of the *Guebres,* or Gaurs, who were called Parsees in India, and who were worshippers of fire, originated with Zoroaster, the author of the Zend-avesta, about 500 B. C.

The idol *Rimmon* of the Syrians, is supposed to have been the same either as Bel or Mylitta; and among their other gods were Asimah and Adad or Hadad; Elagabolus or Aglibolus and Malachbelus; the two latter of which were introduced afterwards into Rome. The principal gods of the Phœnicians were *Adonis* and *Astarte,* or the sun and moon; the Adonis and Venus of the Classics. The *Cabiri* or Samothracian gods, that is, Ceres, Proserpina, Pluto and Mercury, and indeed most of the Classic deities were borrowed from the Phœnicians. They also worshipped *Beelzebub*, or the fly-god; *Baalpeor* or Belphegor, the stone-god: and *Moloch*, represented as a calf, and typifying the sun or fire. The Philistines worshipped *Dagon*, half man and half fish; and *Derceto* or Atergatis, having the form attributed to mermaids.

§ 3. Under the head of *Classic Mythology*, we include the Greek and Roman; which are so nearly identical, that, for brevity's sake, they may be treated as one system. The Romans adopted the deities of Greece, merely changing their names, and adding some fables of their own tradition or invention. Accordingly, we shall here give the Greek names first, and append the Roman in parentheses, to save repetition. The Grecian Mythology was based on the Doric and Orphic hymns, from which Homer and Hesiod borrowed their theogony and cosmogony, or origin of the gods, and the world. Orpheus, being a Thracian, introduced the gods of the Phœnicians; and these were mingled with the Egyptian deities, introduced by Danaus and Cecrops. The gods of Greece were very numerous, and said to inhabit the various parts of the universe. They were classed as the major and minor gods; and as celestial, terrestrial, and infernal. The twelve *greater deities*, were Jupiter, Neptune, Apollo, Mercury, Mars, and Vulcan; with Juno, Ceres, Vesta, Minerva, Diana, and Venus. These, the Romans termed *consentes;* and they added eight other *select* deities; viz. Saturn, Janus, Pluto, Bacchus, and Sol; with Rhea, Luna, and Latona. (See Plate IV.)

Uranus, (Cœlus), or heaven, was represented as the oldest of the gods; and *Gaia*, (Terra or Tellus), that is the earth, as his wife. Their children were *Kronos*, (Saturn), and *Rhea*, (or Cybele), his wife; with Janus, Oceanus, and many others, including the *Titans*, and the *Cyclops*. Saturn was the god of time; and obtained from his brothers the kingdom of the universe, on the condition of destroying all his sons, at their birth; but Cybele secreted *Zeus*, (or Jupiter); *Poseidon*, (or Neptune); and *Hades*, (or Pluto); and their sisters were *Hera*, (Juno); *Demeter*, (Ceres); and *Hestia*, (or Vesta). Jupiter, it is said, dethroned his father Saturn, and became ruler of heaven and earth; allowing to Neptune the dominion of the sea; and to Pluto, that of the infernal regions, or regions of the dead, hence called *Hades;* including *Tartarus*, or the abode of the damned, and *Elysium*, or the abodes of the blest. Of the sisters, Juno is said to have become the wife of Jupiter, and queen of heaven; Ceres, became the goddess of corn and harvests; and Vesta became the goddess of fire and of purity.

The offspring of Jupiter, it is said, were *Apollo*, (or Phœbus); *Hermes*, (or Mercury); *Ares*, (or Mars); *Hephæstus*, (or Vulcan); *Pallas*, (or Minerva); and *Artemis*, (or Diana); besides *Dionysus*, (or Bacchus); *Hebe*, (or Juventas); *Persephone*, (or Proserpina); and the Muses, the Graces, the Infernal Judges, and the demigods, Perseus, Amphion, Zethus, Castor, and Pollux. The first six of this long list are in the number of the greater deities. Apollo was the god of music and poetry; Mercury, the god of eloquence, and of commerce; Mars, the god of war, *Bellona* being his wife; and Vulcan was the god of fire. Minerva, sprung from Jupiter's brain,

PLATE IV. MYTHOLOGY.

JUPITER.

JUNO.

NEPTUNE

MINERVA.

PLUTO.

CERES.

Engraved by R. S. Gilbert, Phila.

was the goddess of wisdom; Diana was the goddess of hunting, and of chastity; and *Aphrodite*, (or Venus), sprung from the foam of the sea, was the goddess of love and beauty.

Of the select deities, Saturn, already mentioned, was the god of time; and Janus, his brother, presided over the year. Pluto, we have already mentioned as the brother of Jupiter; and Bacchus, the god of wine, as Jupiter's son. Sol, is but another name, or form, of Apollo, or the sun; as Luna is of Diana, or the moon. Rhea or Cybele, has been mentioned as the wife of Saturn, who reigned with him in the golden age; and Latona, the mother of Apollo and Diana, is reckoned by some as one of the select deities, though others mention Genius in her stead.

Hebe was the goddess of youth, and originally Jupiter's cup-bearer; and Proserpina, who was carried away by Pluto, became the queen of Hades. Of the *Muses*, Clio, Calliope, Erato, Thalia, Melpomene, Terpsichore, Euterpe, Polyhymnia, and Urania, who collectively presided over the liberal arts; of the *Graces*, Aglaia, Thalia, and Euphrosyne; of the *Infernal Judges*, Minos, Rhadamanthos, and Æacus; of the *Gorgons*, Medusa, Stheno, and Euryale; the *Furies*, Alecto, Tisiphone, and Megæra; the *Fates*, Clotho, Lachesis, and Atropos; of the *Rural Deities*, Pan, Silenus, the Fauns, and Satyrs, Flora, Pomona, the Naiads, Limnads, Oreads, and Dryads; of the *Marine Deities*, Nereus, Proteus, Triton, and the Nereids and Sirens; of the *Winds*, Æolus, Boreas, Eurus, Notus, and Zephyrus; and of various other deities, demigods, and heroes, we have no farther room here to speak. The Naiads, we can barely remark, were nymphs of the rivers, brooks, and fountains; the Limnads, of lakes, and pools; the Oreads were nymphs of the mountains; and the Dryads were nymphs inhabiting forests and trees.

§ 4. The *Hindoo Mythology*, is a kind of Pantheism, regarding the Universe as God, or rather as the animate body of which God is the soul. The doctrine of transmigration probably originated in India, and is the continual key to its complicated system of deities and incarnations. The sacred books of the Hindoos, are the four *Vedas* or Vedus, containing prayers and precepts; six *Angas*, which are commentaries on the Vedas; four *Upavedas*, relating to sciences and arts; and lastly the *Upangas*, consisting of the Puranas, the Derma-Shastras, and the Dersanas, partly mythical and partly philosophical. To the Derma-Shastras belong the ordinances of *Menou*, containing a code of laws and customs, with a poetical account of the gods and of the creation. All these sacred books collectively are called the *Shastra* or Shasters. The original God, called *Brahm*, or Brahmatma, according to Menou, first created the waters; from which sprang a golden egg, blazing like a thousand suns; and from this egg was born *Brahma*, self-existing, floating on a lotus leaf. Others say that Brahma sprang from *Narayana*, or the spirit moving on the waters. Brahma is generally regarded as the creator of the visible world, and another of the Vedas; but as now in a state of retirement or rest. His wife *Seraswatee*, Saraswati, or Brahmini, is regarded as the patroness of learning.

The three principal gods of the Hindoos, are Brahma the creator, Vishnu the preserver, and Siva the destroyer; though the two latter may be regarded as incarnations of the former. Of Brahma, we may add to what is said above, that he is the parent of the *Rishis* or *Menus*, seven or ten in number, including Adimi or Swayambhuva, and others; probably corresponding to Adam and the patriarchs: and the *Brahmins* (or Bramins) claim to have proceeded from Brahma's mouth. *Vishnu*, (or Veeshnoo), the preserver, is represented with several heads, and regarded as omnipotent and omniscient. He is said to have passed through nine *avatars*, or incarnations, to save or benefit the world; and the tenth is yet to come. As the Matsyavatara, or fish avatar, half man and half fish, he preserved the ark, and rescued the Vedas from a demon; and as the Kurmavatara, or tortoise avatar, he sustained the world when shaken by demons, and churned the sea, to enrich mankind. In the boar, and lion avatars, he rescued the earth from *daityas* or wicked demigods; and as the dwarf avatar he humbled the impious Mahabeli. His last four avatars were in human shape; as Rama Parasu; as Rama Chandra (or Ramatshandra); as *Krishna*, (Creeshna) or Juggernaut; and as *Boodhu*, (or Budha), the founder of a new religion. *Laksmi*, Lakshmi, Sita, or Sree, the goddess of fortune and plenty, was the wife of Vishnu.

Siva, (Shiva, or Shivu), the destroyer, called also Mahadeo, Mahadeva, Iswara, and Rudra, is a personification of time, or of fire; and *Parvati*, (or Parvadi), called also Durga, Doorga, Devi Kali, or Bhavani, the goddess of marriage, and punisher of evil doers, was his wife. Their sons, were *Ganesa*, (or Guneshu), the god of policy and cunning; and *Kartikya*, (or Kartikeya), the god of war. *Indra* was regarded as lord of the elements, and *Aindri* as his wife; *Pavana* or Vayu, as god of the winds; *Agni*, (or Aghni), as the god of fire; *Prithivi*, as goddess of the earth; *Varuna*, as ruler of the ocean; *Surya* or Sooryu, of the sun; *Chandra*, of the moon; and *Yama* or Beli, as ruler of all the dead. Nareda was the god of music; Cuvera or Cubera, of riches; and Nirit, of purification. The *Suras* or Soors are good angels; the *Asuras*, or Asoors, evil ones; of whom Mahasoor is chief. The *Apsaras* are beautiful maids of heaven; the *Dewtas* or Devitas, are genii; some good, as the *Ginarers*, Ganduwers, or Gandharvas; some evil, as the *Danava* or devils.

The *Swerga* or Swega-Surgs, is the paradise of Indra, on the top of Mount Meru; and *Padalon*, or Patala, is the infernal region; of which *Nirurdi* is king, and *Padurbati*, judge. The Hindoos believe that three great periods called *Calpas* have elapsed; and the present one they call Kali-Yug; at the end of which, Vishnu, as the tenth or horse avatar, will destroy the world; and all spirits will be reabsorbed into Brahm, the Eternal. The principal Hindoo sects, are the *Vaishnavas*, or Voisnuvus, who worship Vishnu, chiefly on the eastern coast; the *Saivas*, or Soivus, who worship Siva, chiefly on the western coast; the *Sactas*, or Shaktus, who worship the *Sacti* or goddesses, particularly Doorga; the *Sourus* who worship Surya or the sun, and the *Ganuputyus* who worship Ganesa. Their worship consists of visits to the Pagodas; and of ablutions, sacrifices, and tortures; with cruel and horrid ceremonies, such as immolation under the car of Juggernaut.

Boodhism, or Budhuism, comprehends the worship of Budhu, in Hindoostan, and the countries east and north of it. Budhu, we have already mentioned, as the ninth avatar, or incarnation of Vishnu; whose era was about 544 B. C. He came, it is stated in the *Jatas*, as an ascetic philosopher, to reform a corrupted religion. The Boodhists say that four deities have already appeared, and Budhu is the fifth; and that he is yet to reach a higher state of perfection. Some of the sect, as in Ceylon, worship other Hindoo gods, as subordinate to Budhu; but most of the Boodhists regard him as the only god now claiming their worship. A sect called *Jainas*, have a god Reshaba, who they say became incarnate nearly in the same manner as Budhu. The *Lamaism* of Thibet, is but another form of Budhism; the *Delai Lama*, or grand priest, being considered as an incarnation of Budhu, and worshipped also in Tartary. His idol is called *Muha-Moonee*, in Thibet; *Godumu* or Gotumu, in Ava; *Shummunu*, in Siam; and *Fo*, in China

The Chinese, as taught by *Confucius*, or Kung-foo-tse, about 551 B. C., worshipped the elements, as agents of the Supreme Deity. About the same time *Lao-Kung*, (or Laou-Kiung), founded the sect of the *Tao-Tzee*, (or Faose), who lived luxuriously; worshipped their own ancestors; and pretended by means of a certain drink to become immortal. *Boodhism* was introduced into China, about A. D. 65. The idol *Fo*, (Foe or Fuh), is the same deity as Budhu; and his priests are called by the Chinese, *Ho-Chang;* by the Siamese, *Talapoins;* and by the Japanese, *Bonzes*. Some of the Chinese worship other gods; as *Lui-Shin*, the thunderer; and *Hai-Vang*, the god of the sea.

§ 5. Under the head of *Scandinavian Mythology*, we include that of the Normans and Saxons, forming an extensive and romantic system. It was introduced from Asia, not long before the Christian Era; systematized by the *scalds* or bards, in their sacred poems, which are included in the Edda; but supplanted by Christianity, before the end of the tenth century. It traces the origin of things to a world of mist and snow, in the north, called *Niffleheim*, and a world of light and fire in the south, called *Mispelheim* or Muspelheim; the heat of which, melting the frost, produced the giant *Ymir* and the cow *Audumbla* or Œdumla, on whose milk the giant fed. From Ymir sprang the evil race of ice-giants; but from the cow proceeded *Bure*, the father of *Bore* or Boer, who married *Belsta*, and had three sons, *Oden* or Woden, *Vile* or Wile, and *Ve*.

These brothers slew the giant Ymir, and out of his body created the world; after which, they formed the first man and woman, *Asker*, and *Emla*. Then appeared *Nott* or night, riding on her horse Hrimfaxi, or blackmane; and her son *Dagur* or day, on his horse Skinfaxi, or shiningmane. Odin, the chief deity, was supposed to dwell, with Frigga his wife, in the palace *Valhalla*, or war-hall, in the city Asgard, the metropolis of heaven, approached only by the bridge Bifrost, or the rainbow. There, heroes slain in battle, were feasted, and attended by the beautiful maidens, the *Valkyrias*. *Thor*, or Thunre, was the mighty god of thunder; *Uller*, his son, was the god of skating and duelling; *Balder*, was the god of justice and goodness; *Forsette*, his son, the god of concord; *Niord*, was god of the sea and navigation; *Frey*, his son, was the god of sunshine and rain; *Tyr* or Tuisco, the god of battles; *Brage* or Braga, the god of wisdom and poetry; *Hoder*, was the blind god; *Vidar*, the powerful god of silence; *Vali*, the god of archery; and *Heimdall*, was the sentinel of heaven. The worship of *Seator* or Saturn was introduced by the Saxons, and was of Roman origin.

Other goddesses, besides Frigga, were *Saga* or Laga, the mysterious; *Syra* or Eica, the goddess of medicine; *Gesione*, of chastity; *Snotra*, of modesty; and *Tylla* or Jylla, of secrecy. *Freya*, daughter of Niord and wife of Hoder, was the goddess of love; Siona, or Soona, of first love; Wara, of marriage; Vara, of truth; Löbna, of reconciliation; Lyna, of preservation; Wora or Vora, of wisdom; and Synia, of law and justice. Iduna, wife of Brage, kept the mystic apples of youth. The *Fairies*, were mostly good spirits, the offspring of the gods; and the three *Nornas*, Urda, Varanda or Verdandi, and Skulda, were the mighty spirits of the past, present, and future.

Loke, one of the ice-giants, was usually an evil spirit, though sometimes reckoned with the gods. *Angerbode* was his wife, and their offspring were the serpent Midgard, the wolf Fenris, and Hela, the dread goddess of death. *Siguna* or Signa was his second wife, and Vali and Nari, their sons. The *Dwarfs*, were produced from the corpse of Ymir; and the *Genii* were good or evil, according as they sprang from the gods, or the giants. The Edda teaches that the *twilight of the gods* is yet to come, when *Surtur* the black will destroy Valhalla and Niffleheim, with most of the gods; after which the great ALFADER will create a new heaven, *Gimle;* and a new hell, *Nastrond*, where even warriors, if vicious, will be doomed to punishment.

The Celtic tribes, in Wales and Brittany, worshipped several gods, corresponding nearly to those of the Romans. The *Druids* were their priests, and had great influence in the direction of their affairs. They believed in transmigration, and worshipped in gloomy groves, or under the oak, their sacred tree.

§ 5. Of *Ind-American Mythology*, we have room for but a few words. The Mexicans believed in one Supreme Deity, *Teotl* or *Ipalnemoani;* but they worshipped several gods or idols; as *Tlaloc*, god of the waters; *Quetzalcohuatl*, god of the winds; *Huitzulupuctli*, Vitzilipuztli, or Mexitli, the god of war; *Nahuatzin*, or the sun; and *Tezcatlipoca*, or Telpuctli, the youngest of the gods, who restored the earth after the flood. The *Peruvians* also worshipped the sun; in whose temple were Virgins of the Sun, like the Roman Vestals. They called the first man *Manco-Capac*, and his wife *Mama Oella*, or Ocolla. The Northern Indians generally worship but one God, and have no idols; believing in a future life of war and hunting, in the land of the great Spirit.

CHAPTER II.

MOHAMEDANISM.

In the branch of Mohamedanism, we shall treat briefly of the spurious religion established by *Mohamed*, or *Mahomet*, the self-styled prophet of the Arabians. His name is often written *Mahomet*, and his religion styled *Mahometanism;* but the former orthography now generally prevails, as the most correct. This religion is also called *Islamism;* the world *Islam* signifying devotion or piety; and its followers style themselves *Moslems*, or *Mussulmans*, that is, the devoted or obedient. This religion, which superseded the *Sabianism* or star worship, as well as the idol worship, of the ancient Arabians, is but a corrupt mixture of Judaism and Christianity, with doctrines more indulgent to the human passions: and its rapid diffusion is due in part to this feature; but still more to the force and violence with which it was propagated. We shall first speak of its History; next, of its Doctrines; and, finally, of its Practice; referring, therein, to the different Sects, into which its followers are divided.

§ 1. The most important part of the *History of Mohamedanism*, is that of its founder. Mohamed, (or Mahomet), was born at Mecca, in Arabia, about A. D. 569; and belonged to the tribe of Koreish, or the Koraishites; his ancestors having been the guardians of the idol temple, called the Kaaba. He is said to have twice visited Syria, as a merchant; and probably learned, from the Nestorian monks, some of the doctrines of Christianity. His marriage with the rich widow *Khadijah*, (or Kadijah), placed him in easy circumstances, and enabled him to indulge in almsgiving and speculative retirement.

In 609, Mohamed first announced to his wife that God had sent the angel Gabriel, to commission him as a prophet, to restore the true religion, and overthrow the prevailing idolatry. His first converts were his wife *Khadijah*, and her cousin *Warakah*, who was a Christian and Hebrew scholar; to whom were soon added *Zeid*, Mohamed's servant; and *Ali*, who was Mohamed's cousin, and who styled himself the first of believers. Mohamed soon began to announce the pretended revelations which compose the *Koran;* in composing which he was probably assisted by Warakah; by Sergius, a Nestorian monk; and by Salon or Salem, a Persian Jew. After the conversion of *Abu-beker* and six others, Mohamed, in 612, announced his mission to his relatives, at a special banquet; when *Ali* declared himself the champion of the new faith. But the converts, being persecuted by the Koreishites, dispersed; and July 16, 622, Mohamed himself, after the death of Abu-Taleb his protector, and Khadijah his wife, was obliged to fly to Medina, where he was triumphantly received by converts who had previously been nominal Christians. This event, called the *Hegira*, or Flight, is the Mohamedan Era.

Mohamed now assumed the sacerdotal and regal dignity; married three wives, of distinguished family, one of whom was a daughter of Abu-beker; and after this, it was, that he proclaimed his authority, by a new revelation, to propagate his religion by the sword. He stimulated his followers, by the doctrine of predestination, by the hope of booty and revelry, and by the promise of a paradise of delights to all who should fall in battle. His first success in arms, was the capture of a rich caravan, in the valley of Beder; but at Mount Ohud, in 625, Mohamed was defeated, and wounded, and pursued into Medina, by Abu-Sophian. In 628, he made a truce with the Koreishites, and the next year he sent embassies to summon the neighboring princes to receive his religion. In 630, his army, inspired by the valor of Khaled, (or Caled), defeated that of the Byzantine emperor Heraclius, near Muta, to the east of Jerusalem; and Mohamed entered Mecca in triumph; proclaiming it the holy city, and its *kaaba*, (caaba), or temple, the sanctuary of Mohamedanism. In 631, called the *year of embassies*, several of the Arabian chiefs announced to Mohamed their conversion to his religion. In 632, he made his last pompous pilgrimage to Mecca; and he died, probably of slow poison, at Medina, in the same year. His religion spread rapidly over Egypt, Persia, Turkey, and Barbary; westward into Spain; and eastward into Hindoostan; as will be farther illustrated in the department of Chronography.

§ 2. The *Doctrines of the Mohamedans*, are embodied in the Koran: for although they admit our Scriptures, or at least the Pentateuch, Psalms, and Gospels, to have been divinely inspired, they maintain that the copies which we now possess are corrupted, and unworthy of trust. They believe that Adam, Noah, Abraham, Moses, and Jesus Christ, were the five great prophets who preceded Mohamed, the sixth and last. The *Koran*, improperly called the Alcoran, is fabled to have been delivered to Mohamed, by the angel Gabriel, in successive small portions, at various intervals, during a period of twenty-three years. *Al-koran*, in Arabic, signifies *The Reading;* and it is also called *al Kitab*, the book; *al Moshaf*, the volume; *al Dhikr*, the recollection; and *al Forkan*, because it is divided into one hundred and fourteen chapters. The parts were collected into a volume by Abu-beker, the father-in-law, and successor of Mohamed; but the numerous manuscripts, it is said, differed so much, that Othman, the third caliph, burnt them all, after compiling the whole anew.

The Mohamedans believe that there is but one *God*, who created all things, and predestined all events; Mohamed being his prophet. They believe in *Angels*, of whom Gabriel, and Michael; and Asrace, the angel of death; and Israfil, who will sound the trump of judgment; are the chief. They also believe in *Devils*, of whom Eblis is the chief; and in *Genii*, the connecting link between men and angels. They believe also in a *Heaven* and *Hell;* each consisting of seven divisions; and that Mohamed ascended through the seven heavens, to the throne of God, in a single night; this ascent being called the *Mesra*, or night journey. In the first heaven, made of silver, he found Adam; in the second, of gold, he found Noah; in the third, of precious stones, Abraham; in the fourth, of emerald, Joseph; in the fifth, of diamond, Moses; in the sixth, of carbuncle, John the Baptist; and in the seventh, composed of divine light, he found Jesus Christ. Above this is, they believe, the Mohamedan Paradise, called *al Jannat*, or the garden, abounding in waters, sunshine, fruits, flowers, and perfumes, where the beautiful *Houris* will be the companions of the faithful.

They say that the first hell, *Gehenna*, will be for wicked Mussulmans; the second, *Ladha*, for the Jews; the third, *Hotama*, for the Christians; the fourth, *Sair*, for the Sabians; the fifth, *Sakir*, for the Magians; the sixth, *al Jahim*, for idolaters; and the seventh, *Hawiyat*, the lowest and most dreadful, for hypocrites. Finally they believe in a general *Resurrection*, and final *Judgment;* to be preceded by seventeen wonderful signs; though the time is known to God alone. Then, redress will be had for all injuries received; and they alone, whose good deeds overbalance their evil ones, will be saved. The just will pass safely over the narrow bridge, *Al Sirat*, while the wicked, and heretics, will fall therefrom into the dismal regions beneath.

§ 3. The *Practice of Mohamedanism*, consists in ablution, prayer, almsgiving, fasting, and making pilgrimages to Mecca, the holy city. Mohamedans are required to pray *five* times in the day, turning towards Mecca, which is called their *kebla*, signifying the point towards which they should turn when praying. Those who are near the *Mosques*, or houses of worship, are summoned to this duty by the voice of the *Muezzin*, or crier. Frequent *purifications*, or ablutions, are also required, as a preparation for prayer; and these united duties are the key to Paradise. *Fasting*, Mohamed called the gate of religion; the lowest degree of it being restraint of the animal appetites; the next, restraint from worldly pursuits; and the highest degree of it, being entire devotion to the Deity. *Almsgiving*, was enjoined by Mohamed, as laying up a store of good works, against the day of judgment. But especially, an annual *pilgrimage* to Mecca, is required of all who can perform it; without which, they might as well be Jews or Christians. The Mohamedans are prohibited from drinking wine; and their moral code, in many points, conforms to the Mosaic Law; but they are allowed four wives; and many other things are permitted, which are contrary to reason and the Scriptures.

There are several different *Sects*, among the Mohamedans, of which little can here be said. The Turks, and some others, believe in the *Sunna*, or second book of life; and hence are called *Sunnites;* or sometimes the sect of Omar. The *Mufti*, in Turkey, is the chief, or primate of their religion; whom even the Sultan advances to meet. Most of the Persians, however, reject the Sunna, and hence are called by the Turks, *Shiites*, (Sheeahs,) or heretics. They believe that *Ali* is the vicar of God, and true successor of Mohamed; therein denying the authority of the first three Caliphs. The *Motazalites*, and other sects, deny that Paradise is yet created, and say that it will be different from that one from which Adam and Eve were expelled.

CHAPTER III.

JUDAISM.

In the branch of Judaism, we shall treat briefly of the Religion of the Jews, both ancient and modern. Their religion, compared with the systems of Paganism, is as peculiar, as their history is remarkable: and their preservation, even to this day, as a distinct, though scattered people, is among the most wonderful events which the world has yet witnessed. But a still higher importance attaches to the Jewish religion, considered as typical of the Christian dispensation, and preparatory thereto: its priesthood and sacrifices, foreshadowing the Saviour, whom the prophets foretold, and the nation so anxiously expected; though they received him not, when he came. We shall first treat briefly of Jewish History, as introductory to this religion; next of the Jewish Scriptures; then of the Doctrines and Ceremonies of the Jews; and lastly of their different Sects and the Rabbinical Writings.

§ 1. The *History of the Jews*, is chiefly contained in the Jewish Scriptures; and continued in the writings of Josephus, and other later historians. The *Jews* are so named from Judah, the fourth son of Jacob; but they were called Hebrews, from *Eber*, their ancestor, until after the Babylonian Captivity; when this name was first applied to them. They are descendants of *Jacob*, the son of *Isaac*, and grandson of *Abraham;* who was descended, through *Eber*, from *Shem*, the eldest son of Noah. Abraham, while dwelling in Ur, in Chaldea, was called of God to sojourn in *Canaan*, which land was promised to him and his posterity. Accordingly he removed to Haran, or Charran, and thence to Canaan, 1921, B. C.;* and although he visited Egypt, on account of a famine, he returned and died in Canaan, 1821 B. C.† Two of Abraham's sons are particularly referred to, in the Scriptures; *Ishmael*, from whom sprang the Arabians; and *Isaac*, the child of promise; whose sons were Esau, father of the Edomites, and *Jacob*, also named *Israel*, the last of the elder *patriarchs*, so called from Greek words, signifying heads of families. From the twelve sons of Jacob, viz.: Reuben, Simeon, Levi, Judah; Dan, Naphtali; Gad, Asher; Issachar, Zebulon; Joseph, and Benjamin; the twelve tribes of *Israel*, including the whole Jewish nation, are descended.

The sale of *Joseph*, by his envious brethren, and his providential elevation to be prime minister of Egypt, led to the migration of Jacob and his other sons into that land, to escape the famine in Canaan, 1706 B. C.‡ In the midst of a corrupt idolatry, they preserved the patriarchal religion in its purity; and their descendants resided in Egypt, in the land of Goshen, till the measure of their oppression by the Egyptian kings was filled; when *Moses* was raised up to deliver them, and to lead them back to Canaan, the land of promise. They left Egypt in the year 1491, B. C.§; and received the *Decalogue*, or Ten Commandments, at Mount Sinai, in the same year. Forty

* 2078 B. C., according to Hales.
† 1976 B. C., according to Hales.
‡ 1863 B. C., according to Hales.
§ 1648 B. C., according to Hales.

years they were detained in the wilderness, in order that a new and more pious generation might enter Canaan; and, during this period, it was, that Moses wrote most of the Pentateuch, and established, by divine command, their ceremonial and civil laws. Moses died, before they entered the promised land; but its conquest and division among the tribes were effected by *Joshua*, 1446, B. C.;* when the Jewish religion and polity may be said to have been completely established. The farther pursuit of this topic must be deferred, until we come to the department of Chronography.

§ 2. The *Jewish Scriptures*, or sacred writings, are called by us the *Old Testament;* in contradistinction from the New Testament, of which we are to speak in treating of Christianity. The first five books of the Old Testament, written chiefly by Moses, and sometimes called the *Pentateuch*, are the oldest writings known to exist: with the exception, perhaps, of some of the Egyptian hieroglyphics; and to them alone we are indebted for the earliest history of our race. These books were deposited, by the Jews, in the holy *tabernacle*, near the ark; and with them were placed the other sacred books, as fast as they were written, till the first temple was completed; when they were all removed by Solomon to that sacred edifice, 1004 B. C.† Numerous copies were made, with great care; and after the return of a part of the Jews from the Babylonian Captivity, and the rebuilding of the temple, *Ezra* the scribe, assisted by the Great Synagogue, collated and arranged the sacred canon, 458 B. C. To the books thus collated, *Simon the Just*, about 295 B. C., added those of Chronicles Ezra, Nehemiah, Esther and Malachi; which made the Old Testament complete. It was translated into the Greek language, it is said, by order of Ptolemy Philadelphus, 284 B. C.; and this version, from its having been made by about seventy translators, is known as the *Septuagint.* Of other translations we have no room here to speak; but remark that most of them have been made by Christians, and in connection with the New Testament.

Ezra divided the Jewish Scriptures into 1. The *Law*, comprising the Pentateuch; 2. The *Prophets*, including the prophetical and historical books; and 3. The *Cetubim*, or poetical books, viz. the Psalms, Proverbs, Ecclesiastes, and Canticles, or the Song of Solomon. But modern biblical critics divide the Old Testament into the *Pentateuch*, or five books of Moses; the *Historical Books*, from Joshua to Esther, inclusive; the *Hagiographa* or poetical books, including the Cetubim of Ezra, together with the book of Job; and the *Prophetical Books*, including those of the four *greater prophets*, Isaiah, Jeremiah, Ezekiel, and Daniel, with the Lamentations; and those of the twelve lesser prophets, whose writings follow the preceding. To insure the accuracy of these Scriptures, the Jewish Rabins have prepared, chiefly since the Christian Era, a work called the *Másora*, in which they state the number of chapters, verses, words, and letters, in each of the sacred books; fixing the pronunciation by peculiar points; and where different readings had crept in, they introduced marginal notes, called *Keri*, and *Chetib*, from Hebrew words signifying *read*, and *write*, affixed to the supposed corrections.

* 1602 B. C., according to Hales. † 1020 B. C., according to Hales.

§ 3. The *Doctrines and Ceremonies of the Jews*, are founded on their Scriptures, but especially on the books of Exodus, Leviticus, and Numbers; and that of Deuteronomy, which repeats or sums up the Divine Law, as given by Moses, with frequent exhortations and admonitions. This Law is regarded by Christians as consisting of three distinct parts: the *Moral Law*, enjoining moral duties, which are binding on all men, in all ages; the *Political Law*, relating to the civil affairs of the Jews; and the *Ceremonial Law*, regulating their ceremonies and forms of worship; the two latter divisions being intended for the Jews alone. The *Decalogue*, or *Ten Commandments*, (Exodus xx. 3—17,) containing the essence of the Moral Law, we need not here repeat. The first table, including the first four Commandments, relates to our immediate duties to God; the second table, to our duties, divinely required, towards our fellow-men. The Political Laws of the Jews also required that idolatry, blasphemy, sabbath-breaking, and all palpable injustice or immorality, should be punished by the magistrates, priests, or people at large; and their Criminal Law was strictly retributive, demanding "an eye for an eye, and a tooth for a tooth."

The Jewish Ceremonial Law, seems to have been designed to impress their minds continually with the great truths of religion; to separate them from the surrounding nations, and thus to guard them against idolatry. For this reason, perhaps, their national worship was confined to one place, and their select priesthood rendered hereditary. They were required to construct a *Tabernacle*, or large tent, of boards and curtains richly ornamented; and this was divided into two apartments, the *holy*, and the *most holy place*, and surrounded by an enclosed area or *court;* it being designed as a *sanctuary*, for the Lord to dwell in, until the building of the temple in Jerusalem, which contained a similar arrangement. In the most holy place, or within the veil, was the *ark of the covenant*, a beautiful chest, containing the two tables of stone inscribed with the decalogue: and the golden covering of the ark, with golden cherubs at the ends, was called the *mercy-seat* or *propitiatory;* above which was seen the *Shechinah*, or visible glory, symbolical of the divine presence. In the holy place, were the golden *altar of incense*, on which incense was daily burned; the *golden candlestick*, with a central lamp, and three others on each side, kept always burning; and the *table of show-bread*, on which bread was always kept, but renewed every Sabbath, and eaten by the priests. In the court, in front of the tabernacle, was the large brazen *altar of burnt offerings*, with *horns* rising from the corners; and the *brazen laver*, for the use of the priests, in washing themselves and the sacrifices, stood near the door of the tabernacle.

The priesthood was restricted to Aaron and his sons, under penalty of death to any others who should assume it; and the *Levites*, divinely selected, from the tribe of Levi, were the priest's assistants. The *priests* wore a linen underdress, coat, girdle, and bonnet; but the garments of the *high-priest* were, besides the underdress and embroidered coat, a *blue robe*, hung around with golden bells; an *ephod*, or outer short coat, without sleeves, and with a curious *girdle*, both being wrought with gold; a *mitre*, or cap, with a golden plate, inscribed with HOLINESS TO THE LORD; and the *breastplate* of judgment, bearing the *Urim and Thummim*, (or lights and perfections), and set with twelve gems, inscribed with the names of the twelve tribes of Israel. The priests were originally consecrated by anointing with oil, and sprinkling with blood; a *burnt offering* and a *sin offering* being burnt at the same time; and a *heave* and a *wave offering* eaten, by the priests; so called, because they were first heaved up, or waved in the air.

A bullock was sacrificed every day by the high-priest, as a *sin offering*, for atonement; and two lambs were offered daily, as a *meat offering*, with wine for a *drink offering*, from the people to the Lord. Various offerings were required or made by individuals, at various times; as *burnt offerings* of choice animals; *meat offerings*, partly burnt and partly eaten by the priests; *peace offerings*, partly burnt, and partly eaten, in which the person offering them participated; and *sin* or *trespass offerings*, made to expiate unintentional offences. The high-priest alone could enter the most holy place, or *holy of holies;* and this only on one day in the year, the *day of atonement*, the tenth day of the seventh month; with self-purifications and offerings; and a ram and two goats for the people: the ram for their burnt offering; one goat for their sin offering; and the other to be let loose, as a *scape-goat*, to bear away their sins.

The annual *Passover* of the Jews, when they ate the paschal lamb, and sprinkled their door posts with its blood, in commemoration of their first born sons being preserved thereby in Egypt, was kept on the fourteenth day of the first month, corresponding to our *Easter*. Hence also, the first born males, both of man and beast, were sanctified to the Lord; and offerings were directed to be made by parents, for the redemption of their first born sons. The feast of *Unleavened bread*, commemorating their hasty departure from Egypt, commenced the day after the passover, and continued one week; on the first and seventh days of which, there were holy convocations of the people; and on the second day was offered a sheaf of the first fruits of the barley harvest. There were holy convocations, also, at the feast of *Pentecost*, or of *harvest*, 50 days after the passover, to offer the first fruits of the wheat harvest; and at the feast of *Trumpets*, on the first day of the seventh month, the beginning of the civil year, announced by the blowing of trumpets. This last, was followed by the feast of *Tabernacles*, fifteen days after it, completing the feast of *ingathering;* on the first and eighth days of which were also holy convocations. The Jews were moreover required to observe every seventh year, as a *Sabbatical year*, when there was no harvest; and every fiftieth year was proclaimed by trumpets as a *Jubilee;* when they rested two years in succession, living on their previous stores: when servants were set free, and lands on lease, returned to their proper owners. Of the laws concerning clean and unclean animals, for food or sacrifice; concerning leprosy, and other uncleanness; purifications and circumcision, we have no room here to speak.

§ 4. The principal *Sects* among the later Jews, were the *Pharisees*, who attached great importance to the ceremonies of religion, neglecting its weightier matters; and the *Sadducees*, who were generally incredulous, denying the resurrection, and the immortality of the soul. The *Scribes*, mentioned in the gospels, were professed doctors of the law, which they expounded to the people. The *Essenes*, were a small and ancient sect, noted for their austerity. The *Karaites*, (or Caraites), are a modern sect, chiefly in the east, who attach no authority to the Talmud; while the *Rabbinists*, chiefly in Europe, regard it as nearly of equal weight with their Scriptures.

The *Talmud* consists of two parts, the *Mishna*, (or Mischna), explaining their laws and customs; and the *Gemara*, which is a commentary on the Mishna. The Mishna was collected by the Rabbi Jehudah, or Juda Hakkadosh, A. D. 200; and is attributed by the Jews to Moses, as its principal author. The Mishna with a Gemara, compiled by Rabbi Eliezer, about the sixth century, forms the *Jerusalem Talmud;* and with another Gemara, compiled by Chaldean Jews, it forms the *Babylonian Talmud*, most frequently referred to. The *Targums*, are Jewish paraphrases of their Scriptures, written in the Chaldee tongue. That of Jonathan Ben Uzziel, on the Prophets, was made about 30 B. C.; and that of Onkelos, on the Law, was made at the time, nearly, of the Christian Era. The Targum of Jerusalem, is on the Pentateuch; and that of Joseph the Blind, is on the Hagiographa. The *Cabala*, (or Cabbala), embracing the cabalistic writings of the Jews, consists of mystical interpretations of the Scriptures, and metaphysical speculations, handed down by tradition, and regarded by them as the sublimest of sciences. The modern Jewish creed, drawn up by the Rabbi Maimonides, in the eleventh century, contains nothing very peculiar, and need not here be repeated.

CHAPTER IV.

CHRISTIANITY.

In the branch of Christianity, we include the whole study of the *Christian Religion;* its Origin and History; its Scriptures and Evidences; and the History and Doctrines of the different Sects which profess to adopt it. The name is derived from that of its divine author and founder: the word Christ, from the Greek, χριστος, like the Hebrew word Messiah, signifying one who has been anointed; as were the Jewish prophets, priests, and kings; whose functions were all united in the incarnate Son of God. We regard the pure Jewish religion as a part of the Christian; which properly embraces the whole Scheme of Salvation, shadowed forth by the sacrifices, foretold by the prophets, and realized by the advent and ministry of Jesus Christ, our Lord and Saviour. To this scheme alone we apply what has already been said, of the incomparable importance of practical religion. (p. 127.) The term Theology, is frequently restricted to

Christian Theology, or the study of Christianity; otherwise called the study of *Divinity*. Various subdivisions of this study have been proposed; but we proceed here to treat of it in three parts, under the titles of Ecclesiastical History; Biblical Divinity; and Sectarian Polity.

Part I.

Ecclesiastical History.

Under the head of *Ecclesiastical History*, we shall here treat of the origin and early progress of Christianity; considered, so far as it may be, independently of the particular sects, into which the Christian world is now divided. The name is derived from the Greek, εκκλησια, *church;* this name properly signifying the whole body of Christians of all ages and nations; though it is also applied to any particular Christian sect, or society. The present topic presupposes a general knowledge of Civil History and Archæology, both ancient and modern; with which it is so closely connected, that the study of each, throws light upon that of the other. After thus glancing over the early History of Christianity, we shall be the better prepared to appreciate the evidences on which it rests. The later Ecclesiastical History, referring chiefly to the various Christian sects which have arisen in modern times, will be reserved for the third part of the present chapter, that entitled Sectarian Polity.

§ 1. Our Saviour was born, four years before the Christian Era, as generally received, (or 4 B. C.), in Bethlehem of *Judea*, which was then under the Roman power. At twelve years of age, (A. D. 8), he disputed with the Jewish Doctors, in the temple; and at the age of nearly thirty-one, (A. D. 27), he was baptized by John the Baptist; soon after which he chose the twelve apostles, and commenced his public ministry. Three and a half years after this, A. D. 31, he was crucified, rose again from the dead, and reascended into heaven, in the presence of many disciples. The first *Christian Church*, was formed, immediately after this event, at Jerusalem; and *James the Less*, or the Just, who was the son of Alpheus, (that is Cleophas), and who was called the brother, though really the cousin of our Lord, was placed over it, as its presbyter or bishop. He was the writer of the epistle which bears his name. He suffered martyrdom, A. D. 62; when his brother Simeon succeeded him. The second church appears to have been formed at *Antioch*, in Syria, by those who fled thither after Stephen's martyrdom; and there, about A. D. 40, the disciples were first called *Christians*. On the approach of Titus, to besiege Jerusalem, the Christians, with Peter and John, warned by our Saviour's prophecy, withdrew in safety, A. D. 70, to Pella, beyond the river Jordan.

Of the Twelve Apostles, *Simon Peter* preached the gospel in Asia Minor, and, according to Eusebius, at Rome also; where he was crucified, A. D. 67. He was regarded as the first bishop of Rome; Linus being his successor. *Andrew*, his brother, is said to have preached in Greece, and been crucified at Patras in Achaia, A. D. 83. *James*, called the *Greater*, the son of Zebedee, was put to death by Herod, at Jerusalem, A. D. 44; and *John*, his brother, the Evangelist and Divine, preached in Asia Minor, until he was banished to Patmos; but returned, and died at Ephesus, A. D. 100. *Philip* of Bethsaida, died at Hierapolis, in Phrygia; and *Bartholomew*, it is said, after preaching in Arabia, Armenia, and India, died in Persia. *Thomas*, called Didymus, preached, it is stated, in Parthia, and probably died in India; and *Matthew*, called Levi, the publican or tax-gatherer, and the Evangelist, is said to have preached and suffered martyrdom in Persia. Of *James* the *Less*, we have already spoken, in the preceding paragraph; and *Lebbeus*, his brother, surnamed Thaddeus, called also Judas or Jude, preached and died, it is said, in Syria; after writing the epistle which bears his name. *Simon* the Canaanite, (or Canaite), called Zelotes, preached and probably died in Africa; and *Judas Iscariot*, the betrayer, committed suicide, A. D. 31.

Paul, originally named Saul, and likewise called an apostle, preached the gospel in all the civilized world of that age; then suffered martyrdom at Rome, A. D. 67. *Mark*, the Evangelist, preached, at Alexandria, in Egypt, and, it is said, died there, A. D. 62. He is regarded as the first bishop of Alexandria; Annianus being his successor. *Luke*, the remaining Evangelist, probably the same person as Lucius of Cyrene, was long the companion of Paul, but died in Achaia. *Timothy*, is said to have suffered martyrdom at Ephesus, some years after the death of Paul; and *Titus*, it is believed, died in Crete, at an advanced age. Thus, we perceive that the labors of the apostles and evangelists, were the means of introducing Christianity, throughout the then civilized world, within the first century after the Christian era. The Gauls also received the gospel, either from the apostles themselves, or from their immediate successors; and it was preached, during the second century, to the Spaniards, Germans, and Britons. To Eusebius we are indebted for much information concerning the early churches, and their bishops, down to the Council of Nice; but the mention of the Christian Fathers, must here be postponed to the head of Patristic Theology.

§ 2. Historians enumerate *ten Persecutions*, which the Church underwent, before Christianity became the established religion of the Roman Empire. They were, 1. Under the emperor Nero, A. D. 64, who after setting fire to Rome, charged the same upon the Christians; 2. Under *Domitian*, A. D. 95, who suspected the Christians of aiming at a new monarchy; 3. Under *Trajan*, A. D. 100–105, in behalf of the Pagan religion; 4. Under *Aurelius Antoninus*, about 177, most violently waged in Gaul (or France); 5. Under *Septimius Severus*, 192–202; 6. Under *Maximinius*, 235; 7. Under *Decius*, 249–50, which was general and extremely violent; 8. Under *Valerian*, in 257; 9. Under *Aurelian*, in 274; and 10. Under *Dioclesian*, A. D. 303. Of the heresies of the Gnostics, Ebionites, Nicolaitans, and numerous other sects of the early times, we have no room here to speak.

Christianity was first completely tolerated by the emperor Constantine, A. D. 313; and thenceforward became the favored religion of the Roman Empire. No sooner was the Church thus freed from pagan persecution, than it was agitated by the doctrines of *Arius* of Alexandria; who maintained that Christ was a created being, entirely distinct from the Father, who alone was truly God. On this account, Constantine assembled the *General Council of Nice*, which met in 325 at Nice, (east of Constantinople), and almost unanimously declared that Christ, the Son, was coëternal and consubstantial with the Father, and with Him and the Holy Ghost to be worshipped as the one and only true God. To enforce this doctrine, the creed was adopted, which, in a modified form, is still used as the Nicene Creed. Arius was banished, but afterwards recalled; and notwithstanding this decision, *Arianism* afterwards prevailed for some time in the East.

To oppose the heresies of *Arius*, *Sabellius*, and others, a second General Council was held at Constantinople, A. D. 381. The sect of the *Pelagians* next arose, founded by *Pelagius*, a Welch monk, who went to Rome, and in 410 to Africa; maintaining that Adam's descendants are not affected by his sin, and that salvation may be merited by our own good works. His tenets were refuted by Augustin, bishop of Hippo, and condemned by the General Council of Ephesus, in 431. At this Council, *Nestorius* was also condemned, for refusing to call Mary the mother of God, and for maintaining the existence not only of two natures, but also of two persons in Jesus Christ. From him are named the *Nestorian* or *Syrian* Christians, in the East, called also Christians of St. Thomas. There were other Councils held in the East, at Chalcedon, in 451; at Constantinople, in 553; at Constantinople, in 680; at Nice, in 787; and at Constantinople, in 869; making in all eight Œcumenical or general councils, called by the Byzantine or Greek emperors.

§ 3. The bishops of Jerusalem, Alexandria, Antioch, Constantinople and Rome, had at an early period taken precedence over the others; and they received, about A. D. 400, the title of *patriarchs*; which the Eastern metropolitan bishops still retain. The name of *pope*, (or papas), from the Greek, παππας, father, was common, in the third century, to all the bishops; and is still given to the Greek priests in Russia. Though applied to the bishop of Rome, it was not monopolized by him, till the time of Gregory VII., in 1073. The bishop or *pope* of Rome, at length claimed, as the successor of St. Peter, the primacy over all the others; which was confirmed by the provincial synod at Sardica, in 344; as also by the Council of Constantinople, in 381, which made the bishop of Constantinople second in rank; and again, by the western emperor Valentinian III., in 445. The General Council of Chalcedon, in 451, conceded to the Roman bishop a precedence in rank, but refused to admit that he was vested with any superior authority. At length, disagreements arose, which led Pope Felix II., A. D. 484, to excommunicate the patriarchs of Constantinople and Alexandria; and thus the *Eastern or Greek Church* was separated from the *Western or Roman*: though both assumed the title of Catholic or universal. They were afterwards united, at intervals, till the downfall of the Byzantine empire; but never in a cordial, intimate manner.

The farther progress of the Roman papal power, we must reserve, to sketch in the department of Chronography. The *monastic system*, under which monks and nuns secluded themselves, for professed lives of devotion, was introduced into the Church by Antony, in Egypt, about 305; and extended by Pachomius, his disciple. It soon spread through all the Christian world; and, in connection with papal celibacy, has been a fertile source of crime and degradation. The *worship of images*, commenced in the sixth century, in the East; and, though condemned at Constantinople in 754, it afterwards prevailed, both in the Greek and Roman churches. Meanwhile, the gospel was further preached, in France by *St. Denis* or Dionysius, about A. D. 290; in Ireland, by *St. Patrick*, who died there about 493; in England by *St. Augustin*,* the monk, who died about 608; in Germany, by *St. Boniface*, or Winfrid, who died in 755; in Denmark, by *Ansgarius*, who died in 865; in Sweden, by *Sigfrid;* in Prussia, by *Adalbert* of Prague; and in Northern Sclavonia, by *Otho*, in 1124. The Roman church was also extended into Spain in 586; and into Poland, about 964. Russia was united to the Greek church, in 988.

Of modern *Missions*, and their vast importance, we have no room here to speak; and the history of the *Reformation*, we must defer to the third part of the present branch; that on Sectarian Polity.

Part II.

Biblical Divinity.

Under the head of Biblical Divinity, we include the immediate study of the Bible, and of those works which are most serviceable in defending and explaining it. These studies we regard as preeminently important, in the whole wide range of human knowledge; and hence we recognize the necessity, that men duly qualified, by talents, learning, and piety, should be relieved from secular pursuits, and devoted to the especial investigation, and illustration of the numerous topics herein comprehended. Among the works which are deemed most valuable, as aiding to defend and explain the Scriptures, we may mention the writings of the early Fathers, in connection with the more recent treatises on Natural Theology, and the Evidences of Christianity. These studies, together with Biblical Criticism, and Hermeneutics, will form the subjects of the present division of Christianity.

§ 1. *Biblical Criticism*, comprehends an investigation of the origin, and continued preservation of the sacred books; and of their exact signification or interpretation. These sacred books, collectively, we call the *Bible;* from the Greek, βιβλος, a book; it being so called by way of eminence. The Bible is generally recognized, by all Christian sects, as a Revelation from the Deity, and therefore of Divine authority. It consists of the *Old* and the *New Testament;* the former of which foretels, and the latter fully describes the *Advent* or coming of Jesus Christ, the Son of God, to provide the means of salvation for fallen and sinful man. With this great object, it treats of the creation of the world, and of mankind; the apostacy, or fall,

* Augustin was not the first propagator of Christianity in England: and there is some ground for the opinion, that St. Paul himself preached there and in Germany.

and its consequences; the deluge, and repopulation of the world; the Jewish nation, God's chosen people; their laws and their prophets; their disobedience, and their punishment: and especially, the life and doctrines of our Saviour, and of his inspired apostles;—the whole concluding with a Revelation of events, then, or yet to come.

Of the Old Testament, we have already spoken, as far as we had room, in treating of Judaism. The New Testament was written originally in Greek; excepting perhaps the Gospel of St. Matthew, which some suppose to have been first written in Hebrew, about A. D. 38. This Gospel was the earliest portion of the New Testament; all the books of which were written as early as A. D. 100; and a complete catalogue of which was given by Origen, about the year 200; the same which we now recognize. They were then classed in two divisions, the *Evangelicon*, and the *Apostolicon:* but a more convenient subdivision of them, is into, 1. The four *Gospels;* 2. The *Acts* of the Apostles; 3. The twenty-one *Epistles;* and 4. The *Revelation* of St. John the Divine. The Bible was first divided into chapters by Cardinal Hugo de Sancto Caro, about A. D. 1240; and into verses, by Rabbi Mordecai Nathan, about 1445. The Alexandrian manuscript of the New Testament, now in the British Museum, is believed to have been written in the fourth century. The Bible was first printed in Hebrew, in 1488; and the New Testament was first printed in Greek, in 1514.

Biblical *Hermeneutics*, so named from the Greek ἑρμηνευω, I interpret, is the study of the exact interpretation, or meaning of the Bible. It may be considered as *grammatical*, when it relates to the discovery of the true signification, by means of the grammatical construction, or by the context, comparing the same words as used in different places; and it is termed *historical*, when the meaning is ascertained from historical data, such as a reference to the circumstances, objects, and information of the writer. Indeed, a general knowledge of ancient science and art, may be extensively serviceable in this important study; including an acquaintance with those languages which have the closest affinity to the Greek and the Hebrew. The same principles of interpretation which are applicable to other ancient, or even to modern writings, are, for the most part, applicable also to the Scriptures. The subject of *Biblical Exegetics*, or the practical exposition of the Scriptures, is also connected with Biblical Divinity; but as it is differently treated by different denominations, we may be excused from enlarging upon it, in the present work.

§ 2. *Patristic Theology*, comprehends the study of the writings of the early Christian Fathers; those who succeeded the apostolic age. Their writings are valuable, as the earliest commentaries on the New Testament; and as furnishing abundant evidence of its divine authority. We have room here to mention only a few of the most prominent among them; remarking that, while their writings belong to Biblical Divinity, an account of their lives belongs also to the division of Ecclesiastical History. (p. 146). *Clemens Romanus*, bishop of Rome, wrote two epistles to the Corinthians, and died probably A. D. 100. *Ignatius*, bishop of Antioch, was martyred at Rome,

A. D. 107; and *Justin Martyr*, of Grecian birth, was put to death in Egypt, 164. *Polycarp*, bishop of Smyrna, a disciple of St. John, and author of an epistle to the Philippians, suffered martyrdom, 167; and *Irenæus*, a disciple of Polycarp, and bishop of Lyons, in France, was martyred, in 202. *Tertullian*, of Carthage, author of an Apology for (that is a defence of) the Christian Religion, flourished about the year 200; and *Clemens Alexandrinus*, (Clement of Alexandria), flourished about 206. *Origen*, a Greek, author of the Hexapla, or Bible in six versions, died at Tyre, in 254; and *Cyprian*, of Carthage, was martyred in 258. *Gregory*, surnamed Thaumaturgus, a pupil of Origen, and bishop of Neocæsarea, died about 270; and *Lactantius*, author of Institutiones Divinæ, died in 325.

Eusebius Pamphilus, (of Pamphilia), bishop of Cæsarea, who attended the Council of Nice, and wrote an Ecclesiastical History, died about 340. *Athanasius*, the Trinitarian opponent and successor of Arius, (p. 147), died in 373; *Ambrose*, bishop of Milan, died in 397; and *Chrysostom*, bishop of Constantinople, died in 407. *Jerome*, (Hieronymus), who translated the Vulgate or Latin Bible, died at Bethlehem, in Palestine, in 420; and *Theodoret*, of Greece, who continued the Ecclesiastical History, by Eusebius, down to 429, died soon after that date. Arius, founder of the Arian sect, died in 336; and Pelagius, founder of the Pelagians, died at Jerusalem, A. D. 420. Among the *leading doctrines* of Christianity, taught by the Fathers, and adopted by modern Evangelical Christians, we may mention, the fall of man from a state of primeval innocence; the vicarious atonement of our Saviour, by taking our nature upon him and suffering in our stead; the necessity of repentance, and of faith in him, evidenced by a pure and pious life; and the sanctifying influence of the Holy Spirit, granted to all who seek it; as the only means of salvation. The two *Sacraments;* Baptism in the name of the Father, Son, and Holy Ghost; and the Eucharist, or Lord's Supper, in which bread and wine are received as symbols of the Saviour, are also common to nearly all Christian denominations.

§ 3. *Apologetic Theology*, so called from the Greek απολογια, a plea or reply, includes the defence of the whole Christian scheme of Religion; with the proofs of its divine origin, and incomparable excellence. This subject may be subdivided into Natural Theology, and Evidences of Christianity. The province of *Natural Theology*, is to prove, from the works of nature, that there is a God, all-wise and powerful, the creator and preserver of the universe; a God of justice and goodness, the rewarder of well-doing, and the punisher of iniquity. This may be proved from the marks of design and contrivance visible in the material world; as is amply shown by Dr. Paley in his excellent work on this division of Theology; and especially by the analogy between temporal and spiritual things, or the "Analogy of Religion, natural and revealed, to the constitution and course of Nature," so admirably developed by the learned and pious Bishop Butler.

The *Evidences of Christianity*, comprehend the various facts and arguments which prove the authenticity, credibility, and divine authority of the Holy Scriptures. They constitute a subject of the highest interest; and one which has been fully treated, by the ablest writers, in reply to the cavils of infidelity. These evidences may be arranged as either external or internal; and the former, as either collateral or direct. Among the *collateral* evidences, we may adduce, the imperfect state of man; and the *necessity* of some religion, to guide him in his search after truth and happiness; and to satisfy his moral faculties and nobler aspirations. The view which we have already taken of other religions, will show that this one, alone, is at the same time rational, pure, and adapted to the highest wants, and greatest improvement of both our sentient and our intellectual nature. It is farther so proved, by the fact that those nations, whose religion is the purest Christianity, are the most enlightened and happy; and that other nations approach this state, in proportion as their religion approaches to that of the Gospel.

The direct external proofs of Christianity, include the historical proofs of the *authenticity* of the New Testament. We know that its books were received by the early Church, as genuine and authoritative; from the testimony of the Christian Fathers, already mentioned; and from the great events with which it was connected; including the conversion of the Roman empire. We know it, in short, by a complete chain of the highest evidence, from the apostolic age to the present. The *genuineness* of these books was admitted, even by the early opposers of Christianity: as by Celsus, in the second century; Porphyry, in the third; and the apostate Julian, in the fourth; nor do Josephus, and the other Jewish writers, deny either the currency of these works, or the *truth* of their historical statements. These statements are directly corroborated by the evidence of Tacitus, the Roman historian; and the sufferings of the early Christian martyrs are mentioned by the younger Pliny, by Suetonius, Martial, Juvenal, and other Heathen writers. These sufferings are, in themselves, a strong proof of the *credibility* of those truths which thousands died to substantiate. Not only had the apostles, and other Christian martyrs, no interest in sustaining their doctrines, if false, but they had the strongest temporal interest in abandoning them, even if true: and yet they persevered. The institution of the *Christian Sabbath*, and *Sacraments*, continuously kept, ever since the events occurred which they commemorate, may also be adduced as tangible proof, relevant to this subject.

To the *Miracles* of our Saviour, recorded in these well authenticated books, we may next appeal, in support of the *divine authority* of the New Testament. They were beyond the reach of human art: acts of godlike beneficence, performed in the presence of multitudes, and in plain day; miracles which not even the irritated Jews could either conceal or deny. They were performed for a purpose worthy of such acts, to evince the promised Saviour; and similar acts were permitted to be performed by the apostles, so long as was necessary for this purpose; but no longer. Next to the incarnation, temptation, resurrection, and ascension of our Saviour, we would adduce the conversion and ministry of Saul of Tarsus, the apostle Paul, as the strongest evidence of the divine character of Christianity. The credibility of the Jewish Scriptures, will probably at once be admitted; or at least, no one will attribute them to Christian authors, though they were sanctioned by our Saviour's authority. From them, we have the miraculous voice of *Prophecy*, in support of the Christian religion. All the great events of our Saviour's life and ministry, were foretold by the Jewish prophets, as plainly as possible without defeating their accomplishment; so plainly, indeed, that the Jewish nation were anxiously expecting their Messiah, at the time of our Saviour's advent. Nor were the prophecies less remarkable, which were made by our Saviour; and which have since been fulfilled.

We might dwell on the disinterestedness, purity, and benevolence of our Lord and his followers; on the perseverance of his apostles, in labors and sufferings; and on the rapid spread of the gospel, by peaceful means, as evidences of its divinity; but we must pass on, and glance at the *internal evidences* of Christianity, derived from its surpassing beauty and excellence. We repeat, that it is the only religion which can elevate and restore man to his lost place in the creation; or satisfy his longings after immortality. While it strengthens our good propensities, by divine assistance; it represses and quells those evil passions which no other power can subdue. It teaches a pure and perfect morality, where other creeds have wandered, and science has failed. It has suppressed human sacrifices, and gladiatorial massacres; mitigated the horrors of war; raised the standard of patriotism; provided the means of charity and instruction for the poor: and especially it has raised the female sex to be the companions, instead of the slaves of man. It has established the Sabbath and Sanctuary, to give rest to the body, and spiritual food to the mind; and it has comforted the afflicted, consoled the bereaved, and cheered the departing spirit, with a celestial light, beaming from the world beyond the grave. When sickness and trial come upon us, when nature fails and worldly hopes forsake us, when death approaches, as it must approach to all, then only can we adequately realize the divine character and infinite importance of the Christian Religion.

Part III.

Sectarian Polity.

Under the head of Sectarian Polity, we would comprehend the remaining portion of Christianity; relating to the different Christian denominations; and treating of their History, Doctrines, and Modes of worship. Here, therefore, we would place *Systematic*, or Dogmatic Theology; that is the systematic arrangement of the dogmas or doctrines of religion; of which each sect has some that are peculiar; as also *Elenchtic*, improperly called Polemic Theology; by which each sect attempts to defend its own doctrines, and to refute those which are contrary thereto; and finally *Pastoral* Theology; which comprehends the care of a church, and the duties of a Christian minister. This last, has been subdivided into Homiletics, or preaching; Catechetics, or catechising, that is, instructing the young; Parænetics, or advising, admonishing, and consoling; Prudentials, or self-government; and Consistorials, or church government, and the ordering of forms of worship. And here we remark, that the disagreement of Christian sects, on minor points, instead of discrediting, tends rather to prove the truth of those wherein they agree; as those who have seceded from others, would naturally diverge from them, as widely as their consciences would permit.

§ 1. The *Greek Catholic Church*, at the head of which is the Patriarch of Constantinople, recognizes tradition, as a source of doctrine, besides the Scriptures. It believes in the seven Roman sacraments, and in transubstantiation; admits prayers to the saints, and allows their pictures, but not their images, to be worshipped; and sanctions the monastic system. It also believes that the Holy Ghost proceeds from the Father only: but most of its other doctrines are those of Evangelical protestants; and its corruptions, may, we think, be traced to its connection with the Roman Church, at periods subsequent to their separation, A. D. 484. (p. 147). Its Liturgy, or form of worship, consists of the mass, or service of prayer; together with the reading of passages of Scripture, and legends of the saints; the rehearsal of the creed; the singing of psalms; and the performance of various ceremonies. The *Russian Church* coincides with the Greek, in its doctrines; but since 1701, it has acknowledged the Emperor as its head or Patriarch. Of the *Nestorian Church*, whose tenets are mostly evangelical, and whose patriarch resides at Mosul on the Tigris, we have no farther room to speak. The *Coptic Church*, in Egypt, agrees, for the most part, with the preceding; and has a patriarch of its own at Alexandria.

The *Roman Catholic Church*, which also assumes the title of catholic, or universal, and at the head of which is the Pope of Rome, originally professed the simple Evangelical doctrines of the Nicene Creed, which it still retains; but it, moreover, recognizes the authority of Tradition, and of the Ecclesiastical Councils, as coördinate with that of the Scriptures; and, on this ground, it has superadded from time to time new doctrines, which the Scriptures neither contain nor allow. Among these doctrines, sanctioned by the *Council* of *Trent*, 1545–63, and still maintained, are that of *Seven Sacraments*, viz. Baptism, the Eucharist, (or Lord's Supper), Confirmation, Penance, Extreme Unction, Ordination, and Matrimony, which, are maintained to confer grace on those receiving them; also the doctrine of *Transubstantiation*, or the actual conversion of the sacramental bread and wine into the body and blood of our Lord; which, with the accompanying mass, or forms of prayer and ceremonials, is deemed a true propitiatory sacrifice for both the living and the dead; also the doctrine of *Purgatory*, or a middle state between Heaven and Hell, for those souls which, though not accepted of God, are still within the reach of salvation, by the prayers of the faithful; and especially the doctrine of the *Supremacy of the Pope*, as Christ's Vicar, and the *Infallibility of the Church*, by which some understand the Pope, but others, solely the Council. By *penance* is meant acts of supposed expiation for sins committed; and by *extreme unction*, the anointing of those dangerously ill, with consecrated oil.

The *Veneration of images*, and *Worship of saints*, or those canonized as such, is not only tolerated, but required by the Roman Catholic or more properly the Roman Church. This Church also requires *auricular* or private *confession* of all sins, to the priests, who claim power to pardon the same; and it maintains that we may save ourselves by our own good works, and have a surplus for the benefit of others, called *works* of *supererogation;* on the strength of which it grants, or has granted not only pardons, but *indulgences* to commit any future sin with impunity, for a certain price. It also sanctions the *monastic system*, and prohibits the *marriage of priests.* In enforcing conformity to these doctrines and requisitions, the *Inquisition*, established in 1204, by the agency of Dominic de Guzman, founder also of the Dominican order of monks; and the *Society of Jesuits*, or order of Jesus, founded in 1536, by Ignatius Loyola, a Spanish soldier and devotee, were engines of tremendous and most cruel power.

After the modern discoveries in the East Indies, and America, the Roman church made great efforts to convert those regions to its own faith; in India, by *Francis Xavier*, the Jesuit, who preached in Hindoostan, Ceylon, and Japan, and died in the year 1552; in Mexico, by *Zummaraga*, its first bishop; in Peru, by *Hernandez Lucque*, who was associated with Pizarro, in its conquest; and in Brazil, by *Vieyra*, and other Jesuits. The first Roman Catholic establishment in the United States was in Maryland, under *Calvert*, son of Lord Baltimore, in 1634.

§ 2. We come next to speak of the *Reformation;* by which a large portion of the Church was restored to a purer form of Christianity; although the reformers themselves afterwards became divided, on various abstract or minor points of Christian doctrine. The Inquisition was first directed against the *Waldenses* and *Albigenses*, who had long opposed the corruptions of the Roman Church; and had been condemned therefor, by the great Lateran Council, at Rome, in 1139. But the pioneer of the Reformation is usually considered to have been *John Wickliffe*, of Yorkshire, England, who died in 1387. He attacked the jurisdiction of the pope and bishops, and exposed their absurdities and impositions. His followers were called *Wickliffites*, or improperly *Lollards;* (this last being a sect of German dissenters); but they were few in number and unsupported; and their doctrines made but feeble progress. The same was the case with the *Hussites* in Bohemia, the followers of John Huss, who suffered martyrdom in 1415. It was reserved for *Martin Luther* to brave the thunders of the Vatican, (the papal palace), and to effect, on a large scale, the Reform so much needed.

Luther was an Augustinian Monk, and a professor of Theology at Wittemberg, when he first ventured to preach against the abuse of indulgences, then offered for sale there, by Tetzel, a Dominican friar or monk, A. D. 1517. This was followed by long and widening disputations; and in 1519, Luther, sustained by the elector Frederick of Saxony, began to deny the title of the pope to supremacy or infallibility. He was excommunicated by the pope, Leo X., in 1520; and outlawed by Charles V., by the *Edict of Worms*, in 1521; but he lived to translate the Bible into the German language, and to see the Reformation widely spread, before his death, in 1546. Luther rejected the spurious sacraments, retaining only baptism and the eucharist; but he believed that the body and blood of our Saviour are actually present in the sacramental bread and wine; which doctrine is called *consubstantiation* or *impanation*. He exploded the doctrine of purgatory, auricular confession, monastic vows, priestly celibacy, salvation by merit, works of supererogation, indulgences, prayers to saints, worship of images, and also the adoration of the *host*, or image of our Saviour, held up during the Roman mass.

The early *Lutherans* believed in the predestination of mankind to happiness or misery, according to God's foreknowledge of their character; but this, and other doctrines of his, are more or less modified at the present day. The term *Protestants*, was first applied to those Lutheran princes who protested against the unfavorable measures of the *diet at Spire*, in 1529; and it has since been extended to all the seceders from the Roman Church. The Protestant cause was much aided by the *League of Smalcalden*, in 1530, and its harmony promoted by the *Confession of Augsburg*, or articles of faith drawn up by Melancthon, in the same year. In Norway, Sweden, and Denmark, the *Lutheran* Church is *Episcopal*, or presided over by bishops; but in Germany its affairs are directed by a *Consistory*, having a president, and different grades of Clergy. The Lutheran church was introduced into the United States by the German settlers, as early as 1725.

Calvinism, embraces the doctrines of John Calvin, professor of Theology at Geneva, who died in 1564. Its leading articles, as adopted by the Genevan Church, and settled by the *Synod of Dort* in 1618, are called the *Five Points;* viz. Total depravity; Unconditional predestination; Particular redemption; Effectual calling; and the Final perseverance of those who are once converted. These doctrines of Calvin have been modified by later theologians; who are hence called moderate Calvinists; while those who adopt them in full, are termed strict Calvinists. The *Huguenots* in France, were mostly Calvinists, tolerated by the *Edict of Nantes*, in 1598, but expelled by its revocation in 1685. Calvinism still prevails in Switzerland, Holland, and Scotland, and to a considerable extent in England and the United States; among the Presbyterians, Congregationalists, and Baptists.

Arminianism, comprehends the doctrines of James Arminius, who was a professor of Theology at Leyden. He promulgated his peculiar doctrines in 1591, and died in 1609. He maintained, in opposition to Calvinism, that God's election, or predestination, is only conditional, or the result of his foreseeing what would be men's voluntary conduct; that atonement was made for all men, and offered to them, though not by all accepted; and he doubted whether converts may not fall from a state of grace, and die in their sins. His doctrines were carried much farther by his followers, the *Remonstrants*, who denied the doctrine of original sin; and maintained that true believers may fall from grace, not only grossly, but finally. These, and other doctrines, contrary to the settled creed of the Belgic Churches, gave occasion for the *General Synod of Dort*, (or Dordrecht), which met in 1618, and condemned the peculiar tenets of the Arminians; whose imprudence led to their cruel persecution, till the death of Prince Maurice in 1625. Their doctrines have found most favor among the Wesleyan Methodists.

§ 3. The term *Episcopalians*, from the Greek επισχοπος, a bishop, though applicable to all who acknowledge the office of bishops, is usually confined to the *Protestant Episcopal Church*, in England and the United States; called also the English Church, or Church of England. This Church first abjured the papal authority under Henry VIII., in 1533; and again under Queen Elizabeth, after the Catholic reign of Mary. The Episcopalians recognize the office of bishops as of divine institution; and of course regard it as the only sanctioned form of church government. The Episcopal Church professes to conform to apostolic doctrine and usage; and traces its line of bishops back to the primitive ages, before the Roman usurpations and corruptions; between which, and the extremes of secession and dissension, it seeks to pursue the narrow path of truth. Its *Liturgy*, or Book of Common Prayer, was compiled by the early Reformers; its materials being drawn from the Bible, or transmitted from the primitive ages of the Christian church; and its doctrines are strictly evangelical, adopting neither the views of Calvin, nor those of Arminius exclusively, but conforming to the Bible alone. The first settlers of the United States, at Jamestown, Va., with their clergyman, Mr. Hunt, were Episcopalians.

The *Presbyterians*, are Protestants, who reject the office of bishops; and contend that the words επισχοπος, or bishop, and πρεσβυτερος, or elder, signify one and the same grade of ministers. Their pastors, accordingly, are ordained by the laying on of hands of other ministers of equal grade; and their church government is vested in an *assembly* of delegates from the churches. The General Assembly, is recognized as having ecclesiastical authority over all the churches which it represents, or which are represented by it. The Church of Geneva, founded in 1533, was Presbyterian; and most of the Presbyterians are Calvinists. This form of government was introduced into Scotland by John Knox, the reformer, after his visit to Geneva in 1555; and retained by the *Covenanters* both of 1581, and 1643. The first Presbyterian church in the United States, appears to have been erected in Philadelphia, in 1703; and the first Presbytery was organized in the following year. Each *presbytery* consists of several churches; and several Presbyteries, associated, compose a *synod*.

The *Congregationalists*, are so called because they believe each church or parish to be entirely independent of all others; its members having a right to select and ordain their own minister. They admit however of a fellowship and association of the churches, on purely republican principles; the name *Independents*, though sometimes given to all this denomination, being properly applicable only to those who decline such association. Their tenets are generally Calvinistic; though some Unitarians claim the name of Congregationalists. The first church of this sect, founded in England in 1602, by John Robinson, was driven by persecution to Holland, and some of its members were the first settlers of Plymouth, New England. Another church was formed in England, in 1616, under Mr. Jacobs; and the name *Puritans*, previously applied to various dissenters, was afterwards applied to this denomination.

The name *Baptists*, is applied to those Christians who require that baptism should be performed by immersion, as an essential requisite to church communion. Like the ancient Anabaptists, they object to the baptizing of infants. Their peculiar doctrines have been maintained by individuals, from the earliest ages; but they first became prominent, at the Reformation, among the *Mennonites*, or followers of Menno, a reformer, who began to preach in Germany, in 1537. In England, the sect of General Baptists arose as early as 1611, under Mr. Smith; but the Particular or Calvinistic Baptists appear to have separated from the Independents, in 1638, under their leader, Mr. Jesse. The first Baptist Church in the United States was founded by Roger Williams, at Providence, Rhode Island, in 1639; and the Baptists are now the most numerous denomination in the United States.

The *Methodists*, are the followers of Mr. John Wesley, who first organized a class of this sect in 1739, aided by Mr. Whitefield. Their doctrines are mostly those of the Church of England; but leaning rather to Arminianism; though Mr. Whitefield favored the doctrines of Calvin. They acknowledge the authority of bishops, and style themselves the Methodist Episcopal Church. The name Methodist was first applied to Mr. Charles Wesley, from the sedateness and regularity of his life; and the Methodists aspire to moral perfection or freedom from sin. The first Methodist class in the United States, was formed in the city of New York, by Mr. Philip Embury, in 1766; and the Methodists now rank second in numbers, among the religious denominations of our country.

The *Unitarians*, in opposition to the Trinitarians, maintain that Christ was a created being, dependent on the Father; that the Holy Ghost is not a distinct person or essence; and that the Father alone is truly and properly God. The *Socinians*, or followers of Lælius Socinus, who died in 1562, and of Faustus Socinus, his nephew, who died in 1604, maintain farther that Christ was a mere man, who had no existence before he appeared on earth; and they acknowledge him only as a moral teacher, though divinely appointed. Many of the Unitarians are also Socinians. They all reject the doctrine of Christ's atonement for the sins of men; making our own good works the sole ground of divine acceptance; and many of them believe that all men will be saved. These principles date back to the time of Arius and Pelagius; but the *Unitarians* first appeared as a modern sect, in Poland, about 1565; in England, under Mr. Biddle, as early as 1660; and in the United States, under Dr. Mayhew, as early as 1756. The *Universalists* generally believe in the Trinity; but maintain that all mankind will be saved, however sinful their lives may have been. Those who believe that the wicked will be punished for a certain time, before they are beatified, are called *Restorationists;* and their doctrine has been attributed to Origen, one of the Christian Fathers.

The first professedly Universalist Church in the United States, was organized at Gloucester, Mass., under Mr. Murray, in 1779.

The *Moravians*, or United Brethren, are a branch of the persecuted Waldenses; but their present organization was effected by Count Zinzendorf in 1727, when they had settled the village of Hernhut on his estate in the east of Saxony. Hence they are sometimes called *Hernhuters*. They are a small but devoted and evangelical denomination. The *Swedenborgians*, or New Jerusalem Church, are followers of Emanuel Swedenborg, a Swedish baron, who died in 1772. He professed to have received a new revelation, of the true meaning of the Scriptures, which he interpreted in a mystical sense; and he held to a spiritual communion with angels and departed friends, as a source of consolation and improvement. The *Quakers*, or Friends, are the associates and followers of George Fox, who first began to preach their doctrines, about 1648. They believe in the Trinity, but reject the Sacraments, and allow any of their members to preach, who think themselves moved by the Holy Spirit. The *Hicksites*, who have seceded from the Orthodox Quakers, incline to the doctrines of the Socinians. The first society of Quakers in the United States was founded by William Penn. The sect called *Christians*, or the Christian Connexion, originated about the year 1800, among seceders from various other denominations; their leading tenet being entire freedom of opinion in all religious matters. They have no established creed: but profess to make the Bible their sole guide; leaving every individual to interpret it according to his own judgment.

SECOND PROVINCE;

ETHNOLOGY.

In the province of Ethnology, we include the study of Nations, geographically and historically; having regard to their location and strength; their institutions and customs; their origin and history; their distinguished men; and their imaginative literature; these last topics being very closely connected with the preceding. The name is derived from the Greek, εθνος, a nation; and λογος, a discourse. In this province, we comprehend the departments of *Geography*, including Statistics, and Voyages and Travels; *Chronography*, or Civil History and Antiquities; *Biography*, relating to the lives of Eminent men: and *Callography*, or the study of Poetry, Romance, and similar miscellaneous literature. The reasons for placing these departments in this order, and in this province, we have already briefly explained. [p. 34].

V. DEPARTMENT:

GEOGRAPHY.

In the department of Geography, we would comprise a general description of the earth; and especially of the nations by which it is inhabited; in reference to their position and extent; their productions and resources; their institutions and improvements; their manners and customs; and including the subjects of Statistics, and Voyages and Travels. The name is from the Greek, γη, the earth; and γραφω, I describe; or γραφη, a description: and it is a term which admits of indefinite extension; since in describing a nation, allusion must be made to its language, laws, and religion, arts and literature; and in treating of the earth and its productions, we might include the whole range of the physical sciences. The propriety, however, of restricting the term to a single department of human knowledge, as above defined, instead of extending it to comprehend the whole, will, we think, be self-evident: and for this department, we have adopted the present name, in compliance with popular usage, and to avoid the necessity of coining another; even though one more definite might be found.

Geography is properly subdivided into *Mathematical*, which describes the form, imaginary circles, and different modes of representing the earth; *Physical*, which relates to its structure, and elemental changes, and to its natural productions; *Topographical*, which relates to places, and their situation, as shown by maps and gazetteers; *Statistical*, which relates to the extent, strength, and resources of nations; *Civil*, which relates to nations, in regard to their manners and customs, forms of religion and government, and progress in improvements; and *Historical*, or Progressive Geography, which treats of discovery and colonization; and changes of names or of boundaries, of places and states. Strictly speaking, Mathematical, and Physical Geography, belong to the studies of Natural Philosophy, and Natural History; but as some knowledge of them is necessary for the understanding of the other divisions, we shall here treat briefly of them, as an Introduction to the main subject; presupposing the slight mathematical knowledge required for their comprehension.

The propriety of considering *Statistics* as subordinate to, and a part of, Geography, will, we think, be sufficiently evident; though some German writers have so enlarged its boundaries, as to leave little to Geography besides the name. Statistics first received its name and systematic form, from Prof. Achenwall, at Göttingen, in 1749; and the term has been but recently introduced into English works. It relates especially to the strength and resources of nations: and collects from Geography, all the data which bear upon this point. The classification of *Voyages and Travels*, as a part of Geography, and as the sources from which systematic works on this department, have been chiefly compiled, we think all general scholars must approve. We might, in this course, treat separately, the subjects of Ancient Geography, Modern Geography, Statistics, and Voyages and Travels; but we prefer, for the sake of unity, the *Ethnographical method*, of comprehending every thing which relates to one country or division of the world, under one head.

The *General History of Geography*, is itself a subject of much interest. The earliest Geographical records which have been preserved, are the Pentateuch, and other Hebrew Scriptures. They contain much information concerning Judea, and the neighboring regions; and the division of Canaan among the tribes of Israel. Next to these, are the poems of Homer and Hesiod; and the historical books of *Herodotus*, compiled in part from his own travels. The world, as known in his time, 445 B. C., comprehended only the regions bordering on the Mediterranean, Black, Caspian, and Red Seas; extending to Ethiopia in the south, and to India in the east. The *Phœnicians*, from Tyre and Sidon, had explored the whole Mediterranean, as early as 1000 B. C.; and we have still an account of the Periplus or voyage of *Hanno*, the Carthaginian, as far south as Guinea, about 500 B. C.; and of that of *Pytheas* of Marseilles, who ventured by sea, 300 B. C., from the Mediterranean to Britain, and thence to Ultima Thule, which was probably the southern extremity of Norway.* More will be said of Voyages and Travels, in treating of the Grand Divisions of the earth.

The earliest regular Geographies, now extant, are those of *Strabo*, who wrote in Greek, and died A. D. 25; and of *Pomponius Mela*, who wrote in Latin, about A. D. 50. They both describe the world as then known, including Britain, and Germany. Much Geographical information is also found in the writings of Aristotle, and in the Natural History of the elder Pliny; but the best ancient Geography was that of *Ptolemy*, (Ptolemæus), who died A. D. 150. It is in eight books, forming part of his Great System, (Μεγαλη Συνταξις), called by the Arabians, the *Almagest;* and it is the first work in which places were defined by their latitude and longitude, as proposed by Hipparchus, who died 125 B. C. The best Arabian Geographies are those of Edrisi, and Abulfeda; and the first modern European geographer, was Guido of Ravenna, who flourished about A. D. 1500. The first *General Map*, which we can mention, was that of *Eratosthenes*, 270 B. C.; and the best ancient Atlas, was that of *Agathodæmon*, prepared for the great work of Ptolemy. The famous *Peutinger Table*, was a map of the military roads of the Visigoths, compiled as early as A. D. 1190. The invention of the *Terrestrial Globe*, is attributed to Anaximander, about 580 B. C.; and the first modern one is said to have been constructed by Martin Behaim, (Behem, Behin, or Boehme), of Nuremberg, as early as 1492.

A few words on *Mathematical Geography*, are all which we have room here to offer. The earth is a large globe, or rather an *oblate spheroid;* revolving on an imaginary *axis*, which passes through its centre, and terminates at the north and south *poles*. That great circle on the earth's surface, which runs east and west, at an equal

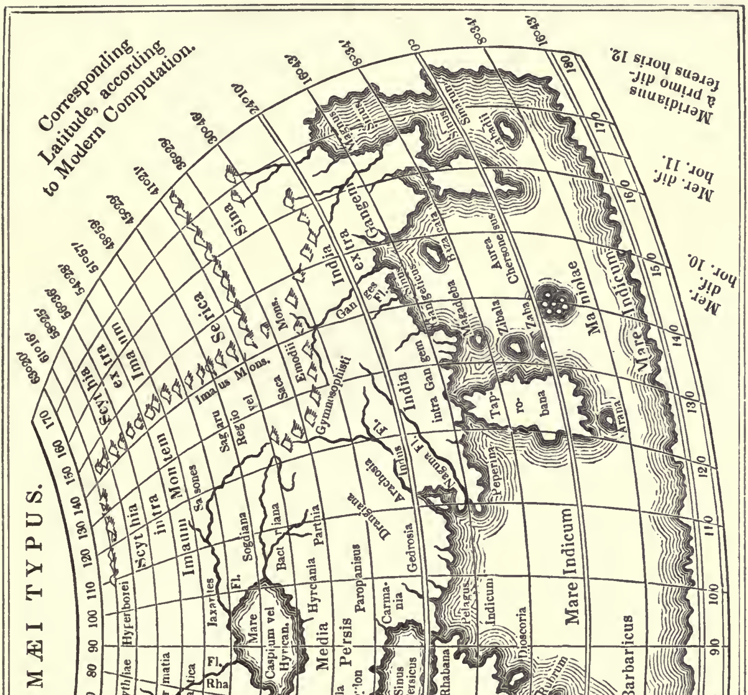
* The *Thule* of Agricola, was one of the Shetland Islands.

distance from both the poles, is called the *equator*. The earth's polar diameter is 7899 miles; its equatorial diameter 7925 miles; and its mean circumference 24,856 miles. Its mean distance from the sun is about 95,000,000 miles; and it revolves around the sun in 365 days, 5 hours, 48 minutes, and 48 seconds; that is, from the vernal equinox to this same point again. The *tropics*, are two small circles, each 23° 28′ from the equator; that of *Cancer* being on the north, and that of *Capricorn* on the south. The *polar circles*, are two other imaginary circles, at the same distance, or 23° 28′ from the poles; the *Arctic* lying around the north, and the *Antarctic* around the south pole. The distance of these circles from the poles, and from the equator, is determined by the inclination of the earth's axis to the plane of its *orbit*, that is, the path which it describes annually around the sun.

These and other small circles, running due east and west, each one of them being everywhere equidistant from the equator, are called *parallels of latitude;* while great circles passing through the poles, and crossing the equator at right angles, are called *meridians*. *Latitude*, is distance measured north or south from the equator; and *longitude*, is distance east or west, from some selected first meridian; both being measured in degrees and minutes. The ancients supposed the earth to have a greater extent eastward and westward, than to the north and south. Hence, distance eastward or westward, they called longitude, or length; while distance towards the north or south, they termed latitude or breadth.* The *ecliptic*, is a great circle, fixed in the heavens, but movable on the earth's surface; and always crossing the equator at an angle of 23° 28′; it being the intersection of the plane of the earth's orbit with the earth's surface; or with the celestial sphere, supposed to be at an infinite distance from the earth, on every side. A *map*, is a representation of either the whole, or a part, of the earth's surface on a plane; and a *chart*, is either a nautical map, or a map on a cylindrical projection, which represents the meridians as parallel straight lines, and thus magnifies the parts towards the poles. The data for maps are obtained from Surveying and Practical Astronomy; but the principles of their construction, belong to Descriptive Geometry.

On *Physical Geography*, we must here be extremely brief; but more will be said on this subject, in the province of Physiconomy. The earth rotates, or turns on its axis, once in 24 hours; thereby causing the alternation of *day* and *night:* and it revolves around the sun once in a *year*, which period of time it measures by this motion. Its annual path or *orbit*, is a plane curve, nearly circular, but slightly elliptical; and its axis is *oblique* to its orbit, but continues nearly parallel to itself; always pointing towards the north star in the heavens, and thus causing the *obliquity of the equator to the ecliptic*. Hence, in our summer, the north pole inclines towards the sun, causing long and warm days; although the earth is then farthest from the sun; but in our winter the case is the reverse. Thus, the

* This idea is illustrated by Ptolemy's Map of the World, (Plate V.), the copy of which here inserted is taken from the one in Cernotis' translation of Ptolemy's Geography, published at Venice, in 1598.



Engraved by R. S. Gilbert, Phila.

obliquity of the earth's axis causes the changes of the *seasons*, and the *inequality of the days and nights*. At the equator, the days and nights are of equal length throughout the year; but in all other parts of the earth there is an inequality, which continually increases as we approach the poles. In latitude 41° 21′ the longest day is 15 hours; in latitude 58° 25′, it is 18 hours; at the polar circles it is 24 hours; and at each pole the sun continues above the horizon six months at a time, appearing to describe a horizontal circle, every day, and never rising higher than 23° 28′.

The inequality of the sun's heat, in different parts of the earth, causes the difference of *Climates;* as approximately indicated by the different zones. The torrid zone lies between the tropics; the temperate zones extend from the tropics to the polar circles, being designated as the northern and southern; and the frigid zones extend from the polar circles to the poles. The climate of the *Torrid* zone is generally hot; that of the *Temperate* zones, warm or variable; and that of the *Frigid* zones, intensely cold. Mountainous regions are always colder than low ones; and even at the equator, at the height of three miles above the level of the sea, there is *perpetual snow*. The animal and vegetable productions of the earth, vary with the climate; having reference, of course, to the altitude of each locality. The smaller and more hardy animals and plants are generally found in the colder regions; and the larger animals and plants, including the more venomous and poisonous, are found chiefly in the torrid zone. Of these, however, and of the mineral productions, and internal structure of the earth, we must defer further notice, to the department of Idiophysics.

The *tides* in the ocean, are chiefly caused by the moon's attraction, as it revolves around the earth; but partly by the attraction of the sun. Similar tides doubtless exist in the *atmosphere*, or vestment of *air*, which surrounds the earth, extending to the height of 40 or 45 miles on every side. The *tides* follow the moon's apparent diurnal motion from east to west; and are generally highest at any place, about two hours after the moon has crossed the meridian; there being a high tide directly on the opposite side of the earth at the same time: but, by the obstructions which the land presents, they are subjected to great irregularities. When the tide is rising at any place, it is said to be *flood-tide;* but when it is falling, it is called *ebb-tide;* there being two flood tides, and two ebbs in about 25 hours; and the extremes of flood and ebb being called high and low water. The highest tide in the world, is at Cumberland Head, in the Bay of Fundy, where the greatest difference between high and low water, at *spring tides*, when the attractions of the sun and moon are united, is 71 feet.

The air, when heated, expands and rises; while colder air rushes in below, to supply its place; thus producing *winds*, or currents of air. The *trade-winds* extend about 30° on each side of the equator, and blow towards it, because it is in the warmest region; but they also incline westward, and, along the equator, blow almost directly from the east, because they come from those parts of the earth that are not moving eastward so fast as the equator is, by the earth's diurnal rotation. The *monsoons*, between the Himmaleh Mountains and Mountains of the Moon, blow from the north-east in summer, and from the south-west in winter; always from the colder to the warmer region. The *hurricanes* of the West Indies, and the *typhoons* of the East Indies, are also produced chiefly by the action of heat; and the *simoom* or *samiel* of the eastern deserts, owes its deleterious effects to its hotness, and dryness, and the sand which it bears along. When this blast is felt in Italy, it is called the *sirocco;* but on the western coast of Africa, it is named *harmattan*. The farther causes of clouds, rains, and storms, must be reserved for the study of Meteorology; and the action of the elements upon the land, will be alluded to in the branch of Geology.

To Physical Geography belongs a description of the different *races of men;* of which there are five principal: the *European*, or white; the *Asiatic*, or yellow; the *American*, or red; the *Malay*, or brown; and the *African*, or black; all of which are here arranged according to their degree of civilization. By the *degree of civilization*, is meant the progress of any race or people in arts and refinement. Of these degrees, we may reckon five; the enlightened, civilized, half civilized, barbarous, and savage; of which we have no room here to speak farther. The European or Caucasian race is characterised by a lighter complexion; a more oval face; and generally by a greater degree of intelligence and refinement, than the other races possess. The Asiatic or Tartar race, has a more yellow complexion; a face nearly square, with dark and straight hair, full cheeks, and small eyes; and this race ranks second in intellectual power and improvement. The Malay race, much resembles the Asiatic; but has a brown or tawny complexion; and is generally inferior to the Asiatic race, in the mental scale. The American or Indian race, is characterised by a copper-colored complexion; straight, black hair; low forehead, and very prominent cheek bones; and this race is generally found in a half civilized or barbarous state. The African, or Negro race, is distinguished by a black or dark complexion, short curly hair, receding forehead, and prominent cheeks; and it holds the lowest place in the scale of improvement.

We shall close this introduction with a glance over *General Topographical Geography*, or the natural features of the earth. More than two-thirds of the earth's surface is covered with water; the largest bodies of which are called *oceans;* five in number. The *Arctic Ocean* surrounds the north pole; and the *Austral* or *Antarctic* Ocean, surrounds the south pole; this name being usually applied to that portion of the continuous waters, which lies beyond the 50th degree of south latitude. The *Pacific Ocean* is about 11,000 miles wide; and the *Atlantic* and *Indian* Oceans are each about 3000 miles wide, at their widest part. A *sea* is a large body of water, next in size to an ocean; and a *gulf* or *bay*, is usually a smaller body of water, also partly enclosed by land: but the terms sea, gulf, and bay, have been applied in many cases without discrimination. A *strait*, is a narrow passage, and a *channel*, a wider passage of water, between two larger portions: and a shallow passage is called a *sound*. A *harbor*, is a small bay, where ships are sheltered by surrounding land; and a *road*, is an outer harbor, or place of anchorage. A *lake*, is a body of water quite surrounded by land, and usually fresh; *salt lakes* being mostly called seas. A *river*, is a large stream of water, formed by the union of smaller streams or *brooks*, and flowing from the higher lands into some ocean, sea, or lake.

The land consists principally of two *Continents* or vast regions, not completely divided by water. The *Eastern Continent* comprises three grand divisions, Asia, Europe, and Africa; and the *Western Continent* or America, comprises two, North and South America. If to these we add Oceanica, a name applied by Malte-Brun to the islands south and east of Asia, we shall have six grand divisions of the land; each including the adjacent islands. An *island*, is a smaller body of land, surrounded by water. Islands may be regarded as mountains or highlands, projecting above water; as lakes are valleys or lowlands, overflowed. A *mountain*, is a lofty portion of land, forming either an insulated *peak*, or a continuous *range*, or *chain*. A *volcano*, is a mountain which, either continually or at intervals, emits fire, smoke, and lava; serving as a chimney to the subterranean fires. Its conical aperture, is called a *crater*. Of more than 200 known volcanoes, about one-half are found in America.

A *basin* or *valley*, is an extent of country bounded by mountains or highlands, and watered by a single river, with its branches. A *plain*, is a level region; whether low, as the *prairies*, *savannas*, or *pampas* of America; or elevated, as the *steppes* of Asia. A *desert*, is a region which, whether sandy, dry, or cold, is destitute of vegetation. An *isthmus*, is a narrow neck of land, connecting two larger portions. A *peninsula*, is a portion of land almost surrounded by water, but connected with some larger portion; as Africa, and South America. A *cape*, is a point of land projecting into the sea; and a high precipitous cape is called a *promontory*. The land is subdivided by mankind into *countries*, occupied by different nations; these, again, into *states*, *provinces*, *cantons*, or *departments;* and these are often subdivided into smaller portions, under various names; containing *cities*, *towns*, and *villages;* the fruits of civilization. Of *edifices*, *roads*, *canals*, and other works of art we shall speak farther in the province of Technology.

We proceed to treat more particularly of Geography, under the six Grand Divisions, of Asia; Europe; Africa; North America; South America; and Oceanica.

CHAPTER I.

ASIATIC GEOGRAPHY.

Asia, the largest grand division of the earth, was the cradle of mankind, and the seat of some of the earliest empires mentioned in history. Central Asia became known to the Greeks, by the expeditions of Alexander; and Thibet and Hindoostan were known to the Romans; the latter by means of the navigation from the Red Sea to

India, which commenced nearly at the Christian Era. China became slightly known to the Romans, at a later period; and to the Arabians, as early as A. D. 850. Western Asia became better known to Europe by means of the Crusades; and Eastern Asia, by the Travels of *Marco Polo*, (or Paulo), the Venetian, 1271–97; of *Schildberger*, a German soldier, in 1396 and after; and of *Mandeville*, an Englishman, 1327–66, whose statements, however, are doubtful. The discovery of the southern passage to India by *Vasco De Gama*, in 1498, led to a farther knowledge of the East, and the establishment of Portuguese settlements in Hindoostan. *Sequeira* sailed to Chin-India in 1510: China was first visited by sea, by *Andrade*, in 1517; and Japan was discovered by the Portuguese in 1542. The English, under Willoughby, in 1544; and the Dutch navigators, in 1596, attempted a passage through the Arctic Ocean to India; but both failed. The Cossack *Deshnew*, is said to have sailed from the north, through Behring's Straits, in 1648; but this passage was named from the Russian Capt. *Behring*, (or Beering), who visited it in 1726. Of later Asiatic voyages and travels, we have no room here to speak; but some of them will be referred to, in the Bibliographical Catalogue, appended to this work.

The following is a table of the extent in square miles, and number of inhabitants of the different countries of Asia, as nearly as we can ascertain.

Countries.	*Sq. Miles.*	*Inhabitants.*	*Countries.*	*Sq. Miles.*	*Inhabitants.*
Asiatic Turkey..	460,000.	11,000,000	Corea	80,000.	6,000,000
Arabia.........	1,000,000.	9,000,000	Thibet.........	450,000.	10,000,000
Persia..........	480,000.	10,000,000	Chinese Tartary	3,000,000.	16,000,000
East Persia.....	470,000.	11,000,000	Indpt. Tartary ..	700,000.	7,000,000
Hindoostan	1,200,000.	130,000,000	Asiatic Russia..	5,300,000.	10,000,000
Chin-India.....	850,000.	30,000,000	Japan†	280,000.	20,000,000
China*	1,500,000.	250,000,000	TOTAL........	15,770,000.	520,000,000

We proceed to treat of the different countries in Asia, in the order above named.

§ 1. The south-western portion of Asia, extending to Hindoostan, was probably the first inhabited portion of the earth. Its productions are wheat, rice, figs, olives, and grapes; oil, wine, and silk. The travelling is generally performed in caravans, on camels, especially over the deserts, though the finest horses are found in Arabia. In all this region the Mohamedan religion still prevails; and females are held in a state of seclusion, almost amounting to slavery. *Asiatic Turkey*, in the extreme west of Asia, comprehends the ancient *Asia Minor*, in the west; *Armenia*, in the north-east; *Mesopotamia*, between the rivers Euphrates and Tigris; *Assyria*, east of the Tigris; and *Babylonia* and *Chaldea*, around the mouths of the Euphrates; the latter being farthest south; though these names are sometimes confounded. The ancient city of *Babylon* was on the Euphrates, at some distance from its mouth; and *Nineveh* or Ninus was far up the

* The population of China is variously stated, at from 150 to 350 millions of inhabitants. We think a medium statement the safest.

† The other Islands lying near Asia, on the south and east, are included in Oceanica.

Tigris. Mount Ararat, on which the ark rested after the flood, is supposed to be in Armenia. *Asia Minor*, between the Mediterranean and the *Pontus Euxinus*, now called the Black Sea, contained the states of *Pontus*, in the north-east; *Paphlagonia*, and *Bithynia* in the north; *Mysia*, *Lydia* and *Caria* in the west; *Lycia*, *Pamphylia* and *Cilicia* in the south; *Cappadocia* in the east; and *Phrygia* and *Galatia* in the interior. The ancient city of *Troy*, or *Ilium*, was in Mysia; and the cities of the seven churches, were in or near the western part of Asia Minor. *Smyrna*, is still the largest city in Asiatic Turkey; *Erzerum*, the next; and *Bagdad*, on the Tigris, was long the capital of the Caliphs. The region between the Caucasus Mountains and the Black Sea, inhabited by the tribe of Kurds, (or Curds), is sometimes called *Kurdistan*. The islands of *Cyprus*, and *Rhodes*, (Rhodus), south of Asia Minor, retain their ancient names; and still belong to the Turkish Empire, of which more will be said in treating of Europe.

Syria, lies along the east end of the Mediterranean Sea, which portion, with the adjacent region, is often called the *Levant*. Syria now comprehends the ancient *Phœnicia*, or land of the cities *Tyre* and *Sidon;* and south of it, *Palestine* or the *Holy Land*, extending to Arabia Petræa in the south-west. It contains the ancient *Palmyra*, or Tadmor, in the east; *Balbec*, (Baalbec), or Heliopolis, toward the west; *Damascus*, south-south-east of Balbec; and *Antioch* in the north-west. *Palestine*, the ancient Canaan, comprehended *Peræa*, and farther north *Batanæa*, both east of the river *Jordan; Galilee* in the north-west; *Samaria* south of it, and *Judæa* in the south-west, between the Mediterranean and the Lake *Asphaltites*, or *Dead Sea*. *Jerusalem* or Hierosolyma, the capital of Palestine, was in the northern part of Judæa; and *Samaria*, was in the northern part of the province to which it gave name. The *Twelve Tribes* of Israel, and their location in Palestine, we have no room here to mention. (p. 161). *Damascus*, is still the largest city in Syria, but *Aleppo*, not far from ancient Antioch, is the capital. Syria belongs at present to the Turkish Empire; having been recently recovered from the Pacha of Egypt, by the aid of other European Powers. *Bagdad* constitutes a distinct sultanry: but is tributary to Turkey.

Arabia, like Syria, retains its ancient name, and extent; reaching from the Mediterranean, on the north-west, to the *Erythræum Mare*, or *Sea of Arabia*, in the south-east; and from the *Sinus Arabicus*, or *Red Sea*, in the south-west, to the *Sinus Persicus*, or *Persian Gulf*. It is usually divided into *Arabia Petræa*, or the stony, including the ancient land of Edom, or Idumea, in the north-west; *Arabia Felix*, or the happy, in the south; and *Arabia Deserta*, or the desert, extending from the centre towards the east and north. In the first of these divisions are the mountains *Sinai*, and *Horeb*, near the Red Sea. The chief cities of Arabia, are *Mecca*, the capital, in the west; *Medina*, north of it; *Sana* and Mocha, in the south; and *Muscat*, which has its own sultan, in the east. Arabia is the land of the ancient Ishmaelites; and the cradle of the Mohamedan religion. It is governed by independent chiefs; but much of the western coast is subject to the Pacha of Egypt.

Persia, lies east of Turkey, between the Persian Gulf, and *Mare Caspium*, or *Caspian Sea*. It contains the ancient *Persia* proper, in the centre and south; part of *Susiana*, in the west-south-west, extending to the mouth of the Euphrates; *Media*, in the north-west; *Hyrcania* and *Parthia*, in the north; and *Carmania*, in the south-east. The ancient *Persepolis*, was in the southern part of Persia proper. *Ispahan*, the ancient Aspadana, is the largest city; but *Teheran*, farther north, is now the capital. Eastward of these two cities lies the Great Salt Desert, extending to East Persia. *Shiraz* is a large city in the south; *Tabreez* in the north-west; *Meshid* in the north-east; and *Yezd* lies eastward of Ispahan. The religion of Persia is Mohamedan; learning and the arts are in a low state; and the government is monarchical; the *Shah* having despotic power. *East Persia*, comprehends the ancient *Aria*, since called *Khorassan*, in the north and north-west; and *Gedrosia* in the south. On the north, it has the ancient *Paropamisan* mountains, now called *Hindoo Koosh;* and it extends eastward to the river Indus. It is usually divided into *Afghanistan*, in the north; and *Beloochistan*, in the south; so named from the Afghan, and Beloochee tribes; both of which are subdivided, under independent chiefs. The chief cities are *Cabul*, between *Candahar* and *Peshawur*, in the north-east; *Herat*, in the north-west, and *Kelat*, in the south. The sovereigns are tyrannical; but the whole country is in a very unsettled state; the fortress of *Ghiznee*, which was the ancient capital, called Ghazna, not far south of Cabul, having been taken, in 1839, by an English and native army from Hindoostan.

§ 2. The *Indies*, or *East Indies*, so called for ages past, comprehend Hindoostan, and the peninsula east of it, now named Chin India. They are the land of sugar and rice, cotton and silk, coffee and spices, which have long been objects of commerce to more western nations. The elephant is there a beast of burthen; and the tiger and anaconda prowl in the luxuriant groves of the bamboo, banyan, or palm. The religion is Paganism, and the people are degraded by gross superstition; but numerous missionaries are there, striving to diffuse the light of science and of Christianity.

Hindoostan, was called from remote times, *India within the Ganges;* extending on the east to the *Sinus-Gangeticus*, or *Bay of Bengal*. Its chief rivers are the *Ganges* in the east; and the *Indus*, or *Sind*, on the western frontier. The *Himmaleh* or Himalaya mountains, on the north, are the highest known; Choumalarie, the loftiest peak, being nearly five and a half miles high. *Ceylon*, south of Hindoostan, is its principal island. The eastern and southern parts of Hindoostan are subject to the British; and the other parts are under separate chiefs, most of whom are tributary to Great Britain; so that nearly all Hindoostan is under British control; acquired through the agency of the *East India Company*, which has an army of 200,000 men, and a revenue of about $100,000,000. Among the cities subject to it, are *Calcutta*, the capital; *Patna*, and *Benares*, on the Ganges; *Madras*, in the south-east; and *Surat*, and *Bombay*, in the west. *Delhi*, towards the north, is the capital of the Great Mogul, who is now a petty prince: *Lucknow*, farther east, belongs to the nabob of Oude; *Lahore*, in the north, is the capital of the Seiks; and *Poonah*, near Bombay, belongs to the Mahrattas. *Gwalior*, south of Delhi and Agra, is said to be the capital of Scindiah, the most independent of the Mahratta chiefs; and *Hyderabad* is the capital of Sinde, bordering on the Indus. *Goa* belongs to the Portuguese; *Pondicherry*, to the French; and *Tranquebar*, to the Danes. British Hindoostan has a governor general, appointed by the sovereign of Great Britain. The Hindoos, or natives, are divided into hereditary *castes;* of which the Brahmins rank the highest; while the lower castes are in a very degraded state.

Chin-India, is a name recently given to the region previously called *India beyond the Ganges;* extending from the Bay of Bengal, on the west, to the Sea of China, on the east. It comprehends the *Birman Empire*, including *Ava* and *Pegu*, in the west; *Siam*, including part of *Laos*, in the centre; the empire of *Anam*, or *Annan*, in the east; and *Malacca*, in the south. The British possess *Arracan*, in the north-west; and some parts of Malacca. The empire of *Anam* comprehends *Tonquin*, and part of *Laos*, in the north; *Cochin China*, in the south-east; and *Cambodia*, in the south. The largest rivers of Chin-India, are the *Irrawaddy*, in the west; and the *Cambodia;* between which is the Meinam, flowing into the Gulf of Siam. The chief cities are *Ava*, *Ummerapoora*, and *Rangoon*, in Birmah; the latter being farthest south; *Bankok*, in Siam; and in Anam, are *Hue*, the central capital, *Kesho*, in the north, and *Saigon*, in the south. The Birmans are said to be intelligent; the Siamese deceitful; and the Malays piratical. The religion is Boodhism, and the governments are despotic.

§ 3. The *Chinese Empire*, includes China, Corea, Thibet, and Chinese Tartary. It is the most populous, and one of the richest empires known; but embraces a great variety of people, climate, and productions. The southern parts of this empire are warm and fertile; but the northern, are cold and barren. *China* proper, called *Sinæ* by the later Romans, extends from the *China Sea*, northward to the *Chinese Wall;* which is 1500 miles long, and was built 2000 years ago, as a defence against the Tartars. Its chief rivers are the *Hoang-Ho*, in the north; and the *Kiang-Ku* or *Yang-Tse-Kiang*, which runs eastward through the centre, and is nearly 2,800 miles long, being the longest in Asia. The *Imperial Canal*, in the north-east, crossing both these rivers, is 500 miles long, and the longest in the world. *Hainan*, on the south, *Formosa*, on the south-east, and the *Loo-Koo* (Leoo Keoo, or Liu Chiu) Islands, on the east, belong to China. The chief cities are *Pekin*, the capital, in the north-east, containing 1,500,000 inhabitants; *Canton*, in the south; and *Nankin*, *Sootchow*, *Hangtchow*, (or Hangtcheou), and *Kingteching*, in the east. China produces rice, cotton, and silk; supplies the world with tea; and excels in the manufacture of porcelain. The religion is chiefly Boodhism; the government is despotic; and the learning of the Chinese mostly superficial.

Corea, east of the *Yellow Sea*, is a small peninsula, tributary to China. *Kingkitao* is its capital, and chief city. *Thibet*, the ancient *Serica*, including *Bootan*, which is tributary to it, lies west of

China, and extends southward to the Himmaleh mountains. The chief rivers of China and Chin-India rise in Thibet; and the *Burrampooter* runs through it, and through British India, to the Bay of Bengal. *Lassa* is the capital, and residence of the Grand Lama; but *Jigagungar*, east of it, is said to be the largest city.

Chinese Tartary, to which alone the name of *Tartary* properly belongs, lies north of Thibet, China, and Corea; extending northward to the *Altaian* (or Altay) mountains; and eastward to the *Seas* of *Japan* and *Okotsk*. It is divided into *Mantchooria*, (or Mandshuria), in the east; including the island of *Seghalien* (or Saghalien); *Mongolia*, in the central part; and *Soongaria*, *Little Bucharia*, and *Little Thibet*, in the west. The western part was anciently called *Scythia extra Imaum;* being beyond the mountains of *Imaus*, in regard to the Romans. The largest river of this region is the *Amoor*, (or Saghalien), in the east; and the great desert of *Cobi* (or Shamo) occupies much of the interior; being 2,000 miles long. Its chief cities are *Seghalien* and *Chin-Yang*, in the east; *Cashgar*, and *Yarkand*, in the west. The Tartar tribes are mostly rovers; living in tents, subsisting chiefly on the produce of their flocks, and held in slight subjection to China.

The *Empire of Japan*, consists of several islands east of the *Sea of Japan;* the largest of which are *Niphon*, the principal; *Jesso*, north of it; and *Kiusiu*, to the south-west. The chief cities are *Jeddo*, the capital, said to contain 1,300,000 inhabitants, *Miaco*, (or Meaco), and *Osaca;* all on the island of Niphon. The religion is Paganism, in various forms; and the government is despotic. The people resemble the Chinese, in their bigotry, their manners, and their devotion to agricultural pursuits.

§ 4. The *Northern Part* of Asia, is generally very cold and barren; and hence thinly inhabited, and imperfectly known. *Independent Tartary*, more properly called *Turkistan*, (or Turkestan), as being the original country of the Turks, comprehends the ancient *Bactriana*, in the south; *Sogdiana*, in the centre; and *Scythia intra Imaum*, in the north and east; extending eastward to the mountains of *Imaus*, now called *Beloor*, or Belur Tag. It includes the *Aral Sea*, and the rivers which flow into it; the *Cihon*, in the east; and the *Amoo*, (formerly Gihon or Jihon), the ancient *Oxus*. This country is now held by the *Turcomans*, in the west; the *Kirghees*, (or Kirguis), in the north; and the *Usbecks* in *Khokan*, *Khiva*, *Great Bucharia*, and *Koondooz*. The chief cities are *Bucharia*, *Samarcand*, and *Balk*, (the ancient *Bactra*), all lying towards the south; *Khokan*, and *Tashkent*, in the east; and *Khiva*, south of the Sea of Aral. Khooloom, in the south-east, is the capital of Koondooz. The Usbecks are more civilized; but the other tribes still live a *nomadic* or pastoral and wandering life. They are governed solely by their *khans*, or chiefs; and the prevailing religion is the Mohamedan.

Russian Asia, including *Siberia*, extends from the *Ural Mountains* and river *Volga*, (or Wolga), on the west, to the sea of Kamtschatka, and *Bhering's Straits*, on the east; and is inhabited by numerous tribes, among which are the *Samoieds*, and *Ostiaks*, in the west;

the *Tungouses*, in the centre; and the *Yakoutes*, *Koriaks*, and *Kamtschatkans*, in the east. The province of *Georgia*, between the Black and Caspian seas, including the ancient *Colchis*, *Iberia*, and *Albania;* and the province of *Circassia* farther north, including part of the ancient *Carmatia*, are nominally a part of the Russian empire; but are at present struggling for independence. The chief rivers of Siberia are the *Obi*, which unites with the *Irtish* in the west; and the *Yenisei*, and *Lena*, more central, all running northward into the Arctic Ocean. On the north are the islands *Kotelnoi* and *New Siberia;* and on the east the *Aleutian* or Fox Islands, which belong rather to Russian America. Among the cities, are *Tobolsk*, the capital, with *Orenburg* and *Astracan*, in the west, the latter being farthest south; *Tomsk* on the Obi; *Irkutsk*, on Lake Baikal; *Yakutsk*, on the Lena; and *Okotsk* (or Ochotsk) on the sea of that name, in the extreme east. Siberia produces furs and minerals; but adds little to the strength of the Russian empire, to which it belongs. It serves as a place of banishment for criminals, particularly those condemned for political crimes; whose lives are often shortened by this severe punishment.

CHAPTER II.

EUROPEAN GEOGRAPHY.

Europe, though the smallest grand division of the earth, has excelled all the others in civilization; and has made far the greater number of discoveries and improvements, in literature, sciences and arts. The southern and central parts of Europe, we have already said, were known to the ancient civilized world; of which Italy and Greece formed important portions. The papal missionaries in northern and north-eastern Europe, acquired much information of those parts; (p. 148); but the earliest authentic account of northern Europe was written by *Alfred the Great* of England; who, in 901, sent *Other* to sail around the North Cape, to the White Sea, and *Wulstan* to explore the Gulf of Finland; both of which objects were attained. Iceland was discovered in 861, by *Naddodr*, a Norwegian pirate; Spitzbergen or East Greenland, in 1553, by *Sir Hugh Willoughby*; and Nova Zembla is said to have been discovered by English navigators, in 1556. Of the numerous modern travels in Europe, we have no room here to speak.

The following statement is the most correct that we can offer of some important statistics of the leading powers of Europe.

Nation.	Debt.	Revenue.	Army.	Navy.
	Dollars.	*Dollars.*	*Men.*	*Ships.*
Great Britain.	3,700,000,000	300,000,000	110,000	600
France	820,000,000	140,000,000	330,000	300
Russia	200,000,000	80,000,000	700,000	160
Austria......	225,000,000	52,000,000	280,000	30
Prussia......	115,000,000	35,000,000	150,000	6
Turkey......	35,000,000	40,000,000	200,000	100
Spain	400,000,000	26,000,000	50,000	26

The following is the most accurate table which we can form of the extent and population of the different countries of Europe.

Countries.	Sq. Miles.	Inhabitants.	Countries.	Sq. Miles.	Inhabitants.
European Turkey	200,000	10,000,000	Baden	5,700	1,200,000
Greece & Ion. Is.	20,000	1,000,000	Wurtemburg	7,600	1,600,000
Two Sicilies	42,000	7,500,000	Bavaria	30,000	4,200,000
Papal States	17,500	2,600,000	Saxony	6,500	1,600,000
Lombardo-Venetia	18,500	4,500,000	Hanover	14,600	1,600,000
Italian Dutchies	13,200	2,300,000	Smaller Ger. St.	28,000	4,300,000
Two Sardinias	29,000	4,500,000	Austria	256,000	34,000,000
Spain	180,000	12,000,000	Prussia	106,000	14,000,000
Portugal	45,000	3,500,000	Denmark & Iceland	51,300	2,100,000
France	202,000	33,600,000	Sweden & Norway	290,000	4,100,000
Great Britain	120,000	25,300,000	Russia and Rus. Poland	1,850,000	60,000,000
Belgium	12,800	4,200,000			
Holland	11,000	2,600,000			
Switzerland	16,000	2,100,000	TOTAL	3,572,700	244,400,000

We proceed to treat of the countries and states of Europe, in the order above named.

§ 1. The *Southern Countries* of *Europe* have a mild climate, and are fertile in the olive and grape, in corn, oil and wine. The present inhabitants are generally less active and enterprising than those farther north; but they still excel in the fine arts; and the spirit of ancient liberty, though fettered there, is not yet annihilated.

Turkey in Europe, extends from the *Pontus Euxinus*, or Black Sea, and the sea of Marmora, the ancient *Propontis*, on the east; to the Gulf of Venice, the ancient *Mare Hadriaticum*, on the west; and the Archipelago, the ancient *Ægæum Mare*, on the south. It includes the ancient *Thracia*, in the south-east; *Mœsia*, in the central part, stretching eastward and westward; *Dacia*, north of the Danube; *Illyricum*, bordering on the Gulf of Venice, in the west; *Macedonia*, south of the Hæmus, now Balkan Mountains; with part of *Thessalia* and *Epirus;* the latter in the south-west, and both belonging to ancient Greece. The more modern state of *Servia* is in the north-western; and *Wallachia* and part of *Moldavia* are in the north-eastern part of Turkey. The ancient cities of *Philippi* and *Thessalonica* were in Macedonia; the latter being the modern *Salonica*. The chief cities of Turkey, are *Constantinople*, the capital, formerly called *Byzantium*, and *Adrianople*, in the east; *Bucharest*, in the north, and *Salonica*, in the south. The island of *Candia*, the ancient *Creta*, with many smaller ones, in the Archipelago, belongs to Turkey. The religion of this country is the Mohamedan; the government has but recently become a limited monarchy, the *Sultan* being at its head; and education, learning and the arts are still in a backward state.

Greece, now an independent monarchy, retains its classic name, and nearly its ancient limits; comprehending the *Morea*, or ancient *Peloponnesus*, south of the *Sinus Corinthiacus*, now Gulf of *Lepanto;* and the province of *Livadia*, or the ancient *Græcia propria*, with part of *Thessaly* and *Epirus*, north of that Gulf: besides the island of *Negropont*, the ancient *Eubœa*, and other smaller islands in the Archipelago. The ancient *Peloponnesus* contained the states of *Argolis* and *Laconia*, in the east; *Messenia* and *Elis* in the west; *Achaia* and *Corinthia*, in the north; and *Arcadia*, in the interior. *Lacedæmon*, or *Sparta*, was the capital of Laconia; *Olympia*, of Elis; and *Corinth*, of Corinthia. In *Græcia Propria*, were the states of *Attica*, east of the isthmus of *Corinth;* and farther north, proceeding towards the west, were *Bœotia*, *Phocis*, the *Locri*, *Doris*, *Ætolia*, and *Acarnania;* this latter bordering on the Gulf of Venice. *Athens* was the ancient capital of Attica; *Thebæ* or *Thebes*, of Bœotia; and *Delphi*, of Phocis. The more northern states were *Thessaly*, in the east, and *Epirus*, in the west; which belong only in part to modern Greece. *Athens*, the present capital, and *Corinth*, retain their classic names; and among the other cities are *Napoli*, in the south-east, near the ancient *Argos*, in Argolis; and *Navarino* and *Missolonghi*, in the west. The *Republic* of the *Ionian Islands*, *Cephalonia*, *Zante*, *Corfu* and others, on the western coast of Greece, is under the protection of Great Britain.

Italy, retains its ancient name; including the ancient *Magna Græcia*, in the south; and *Gallia Cisalpina*, or Cisalpine Gaul, in the north. *Magna Græcia* contained the provinces of *Messapia*, in the east; *Bruttii*, in the south; and farther north, *Lucania* and *Apulia*. *Pæstum*, in the south-west, was a city of Lucania, and *Cannæ*, in the east, a village of Apulia. *Italia Propria*, contained the states of *Etruria* or *Tuscia*, north-west of Rome; *Latium* south-east of it, *Campania*, farther south; *Samnium*, east of Latium; and numerous tribes or states in the east and north-east. *Gallia Cisalpina* included *Venetia*, in the north-east; *Liguria*, in the west, and numerous tribes between. *Italy* is now divided into the Kingdom of the *Two Sicilies*, in the south; the *States of the Church*, or Papal States, next north; and the several Duchies of *Tuscany*, *Lucca*, *Modena* and *Parma*, in the central part: the *Lombardo-Venetian* kingdom, including *Lombardy*, and subject to Austria, in the north-east and north; and the Kingdom of *Sardinia*, including *Savoy*, or as it might be called, the *Two Sardinias*, in the north-west; the two latter states extending to the *Alps*, or *Alpes Montes* of the ancients. The largest river in Italy, is the *Po*, the ancient *Padus;* south-eastward from which runs the Appenine range of Mountains; and Italy contains two of the most celebrated volcanoes in the world; *Vesuvius*, near Naples; and *Etna*, on the island of Sicily. The chief cities of Italy are, in the Two Sicilies, *Naples*, anciently *Neapolis*, the capital, on the main land; and *Syracuse*, and *Palermo*, the ancient *Panormus*, on the island of *Sicily:* in the States of the Church, *Rome*, *Ancona*, and *Bologna:* in Tuscany, *Florence* and *Leghorn:* in the other duchies, capitals bearing their names; in the Lombardo-Venetian Kingdom, *Venice*, and *Milan;* and in the Sardinias, *Turin*, and *Genoa*. Italy has a common language, literature, and religion, and excels in the fine arts; but its divided states suffer from their unhappy political condition.

Spain, called by the ancient Romans, *Hispania*, and by the Greeks, *Iberia*, formerly included *Portugal;* and extended, as it now does, from the *Fretum Herculeum*, or Straits of Gibraltar, on the south, to the *Oceanus Gallicus* or *Aquitanicus*, the Bay of Biscay, on the north. *Hispania* was divided, under Angustus, into

Lusitania, now Portugal, in the south-west; *Bætica*, in the south; and *Tarraconensis*, previously called *Hispania Citerior*, in the north and east; each inhabited by various tribes. The largest rivers of Spain, are the *Ebro*, or ancient *Iberus*, in the east; and the *Douro*, *Tagus*, and *Guadiana*, this last anciently called *Anas*, in the west. The *Pyrenees*, or *Pyrenæi Montes*, separate Spain from France; and to Spain belong the *Balearic Isles*, Majorca, Minorca, and Ivica, in the Mediterranean; as also the *Canaries*, and some of the *West Indies*. *Madrid* is the capital, centrally located; and among the other cities of Spain, are *Saragossa*, *Barcelona*, *Valencia*, and *Carthagena*, (anciently *Carthago Nova*), in the east; and *Granada*, *Malaga*, *Cadiz*, *Seville*, and *Cordova*, in the south. Spain has many shepherds, and grows excellent wool; but agriculture and the arts are nearly prostrate, from long civil wars, and the effects of luxury and superstition. *Portugal*, the ancient *Lusitania*, is in a similar state to that of Spain. Its chief cities are *Lisbon*, the capital, anciently *Olisipo;* and in the north, *Oporto.* The Azores, Madeiras, and Cape Verde Islands, belong to Portugal; and, like it, furnish large supplies of wine for exportation. Here, as in Spain, the Roman religion, supported by its Convents and Inquisition, long held absolute sway.

§ 2. We proceed next to the Geography of *France*, and *Great Britain;* which are strongly associated by historical, political, commercial, and scientific relations. Both are constitutional monarchies; but in France, the Roman Catholic religion prevails; while in Great Britain the Protestant is the established religion; though in both countries other denominations are tolerated.

France, the ancient *Gallia*, or *Gallia Transalpina*, extends from the *Fretum Gallicum*, or English Channel, on the north, to the *Gallicus Sinus*, a part of the Mediterranean, on the south. It was the land of the *Gauls;* and comprehended *Narbonensis*, in the south-east; *Aquitania*, in the south-west; *Lugdunensis*, in the centre and north-west; and *Belgica*, in the north-east. At a later period, it comprehended, among others, the provinces of *Provence*, with *Dauphiny* north of it, and *Languedoc* west of it, all in the south-east; *Gascony*, and, north-east of it, *Guienne*, both in the south-west; *Poitou* and *Anjou*, in the west: *Brittany* and *Normandy*, in the north-west; *Artois*, and *Picardy*, south of it, both in the north; *Lorraine*, *Alsace*, south-east of it, and *Franche Compté*, south of it, all in the east; and *Champagne*, *Burgundy*, and *Auvergne* in the interior, proceeding towards the south. The chief rivers of France, are the *Rhone*, the ancient *Rhodanus*, in the south-east; the *Garonne* and the *Loire*, once called *Liger*, in the west; and the *Seine*, the ancient *Sequana*, in the north. Its mountains are the *Cevennes* or Auvergne mountains, in the interior; the Pyrenees, on the south-western frontier; and the Alps, Jura, and Vosges, which skirt it on the east. The chief cities of France, are *Paris*, the capital, containing 900,000 inhabitants; with *Rouen*, below it on the Seine, and *Lisle* (or Lille), in the extreme north; *Lyons*, in the east, and *Marseilles* and Toulon, in the south-east; *Bordeaux* and *Toulouse*, in the south-west; *Nantes* and *Orleans*, on the Loire, the latter, being nearly central in France; and Brest and Cherburg, in the north-west. The island of *Corsica* belongs to France. The Canal of *Languedoc*, in the south-west, is one hundred and eighty miles long; and there are other important canals, connecting the principal rivers; but these we have no room to mention. France excels in agriculture, manufactures, science and literature; and is now enjoying great national prosperity.

Great Britain, includes *England*, *Wales*, *Scotland*, and *Ireland;* with the adjacent smaller islands, west of the *North* or *German Sea*. The island of *Britain* or *Britland*, was anciently called *Britannia;* and comprehended *Britannia Prima*, in the south; *Britannia Secunda*, since called Wales; *Flavia Cæsariensis*, in the centre and east; *Maxima Cæsariensis*, now the north of England; with *Valentia* in the south, and *Caledonia* in the north of Scotland. The Orkney and Shetland Islands, north of Scotland, and the Hebrides or Western Islands, on the west of it, belong to Great Britain. The *Wall of Hadrian* ran eastward from *Solway Frith;* and that of *Antonine* extended from the *Frith of Clyde* to that of *Forth*. Ireland was anciently called *Ierne* or *Hibernia;* and the Irish Sea, *Mare Hibernicum*. The capital of Great Britain, is *London*, anciently called *Londinium*, on the river Thames; now containing 1,600,000 inhabitants, and probably the largest city in the world. The other chief cities of England, are *Bristol*, *Birmingham*, *Liverpool*, *Manchester*, and *Leeds*, in the west, all excelling in manufactures and commerce; *York*, the ancient *Eboracum*, in the north-east; *Portsmouth*, and *Plymouth*, in the south; and *Oxford*, on the Thames, and *Cambridge*, in the east, famed for their Universities. In Scotland, are *Edinburgh* and *Glasgow*, *Paisley*, and *Aberdeen;* and in Ireland, *Dublin*, *Cork*, and *Limerick*. Great Britain has extensive resources in her exhaustless mines of iron and coal; and her vast manufactories; in which and in extent of commerce, she stands unrivalled. She excels all other nations, except perhaps the United States, in the extent of her canals and railroads; by which all the parts, of England especially, are closely connected. Her progress in science and literature has not been inferior; and she has done perhaps more than any other nation, to civilize and Christianize the world.

§ 3. We come next to *Central Europe*, including Germany and the nations with which it is, or has been, associated. This is a rich and fertile portion of the old world, producing grain, wine, wool, and cattle, in abundance; and the mines of Germany are among the most extensive and celebrated known. In education, arts, literature, and science, Germany shares with France and Great Britain, the foremost place among the nations, notwithstanding her divided political state.

Belgium, is a part of the ancient *Belgica;* and recently formed, in connection with Holland, the kingdom of Netherlands: but it now constitutes a distinct and flourishing monarchy, though of small extent. It includes the old provinces of *Luxemberg*, and *Liege*, in the south-east, *Brabant*, in the east, and the greater part of *Flanders*, in the west. *Luxemberg*, is a part of Germany; and hence the king of Belgium is a member of the Germanic Diet. The largest river in this country is the *Maese*, the ancient *Mosa*. The chief cities, are *Brussels*, the capital; and *Ghent*, *Antwerp*, and *Liege*. *Holland*, was included by the ancients as a part of Germany; and is the country of the ancient *Frisii*, and the modern *Dutch*. It was recently separated from Belgium; and the name *Netherlands* was then superseded by its older one, now restored. The chief river of Holland is the *Rhine*, the ancient *Rhenus*. Much of this country is below the level of the sea, from which it is protected by *dykes* of earth, flagged with wood, and stone. The chief cities of Holland, are *Hague*, the capital; *Amsterdam*, the largest city; *Rotterdam*, and *Leyden*. The Dutch are an industrious people, and still excel in commerce. *Switzerland*, is the country of the ancient *Helvetii;* including the Lake of Geneva, the ancient *Lemanus* or *Leman*, in the west; and extending to the Lake of Constance, in the north-east. It is bounded on the south by the *Alps;* of which the peak called *Mont Blanc*, is the highest mountain in Europe; being three miles high. The chief cities of Switzerland, are *Berne*, the nominal capital; *Basle* and *Zurich*, in the north-east; and *Geneva*, in the south-west. Switzerland is a confederated republic, composed of independent *cantons*, united for national security, in a general diet. The Swiss are a hardy and virtuous people; and though no longer in political connection with Germany, they mostly speak the German language.

Germany, the ancient *Germania*, extends from Switzerland, to the German Sea, or *Oceanus Germanicus*, and to the Baltic Sea, the ancient *Sinus Codanus*. The *Rhine* and the *Danube* were anciently regarded as its boundaries; and it was inhabited by the *Istevones*, in the west, including the *Cherusci*, *Frisii* and *Alemanni;* the *Hermiones*, in the south, including the *Marcomanni*, *Hermunduri*, and *Boiohemi;* the *Vendili*, in the north-east, including the *Longobardi*, *Burgundiones*, and *Gothones;* and the *Chauci*, in the north, bordering on the German Sea. The chief rivers, were, besides the Rhine and Danube, the *Albis* or *Elbe;* the *Viadrus* or *Oder;* and the *Vistula*. The *Erz Mountains* are a part of the ancient *Hercynian;* this name now designating the more south-eastern range. The Harz Mountains, in the north, are a detached group, famous for their mines. *Germany* now forms a part of Belgium, Austria, Prussia, and Denmark; and contains, besides, thirty-one independent states, and four free cities; all united in the *Germanic Confederation;* the affairs of which are regulated by a *Diet* of representatives, for mutual safety and defence.

The five principal states of Germany, next to those above mentioned, are the grand duchy of *Baden*, in the south-west; and the kingdoms of *Wirtemberg* and *Bavaria*, east of it; the kingdom of *Saxony*, in the east; and that of *Hanover*, in the north. The chief cities in these and the smaller states are *Munich* and *Nuremberg*, in Bavaria; *Dresden* and *Leipzic*, in Saxony; *Hanover*, in Hanover; *Stuttgard*, in Wirtemberg; *Manheim*, in Baden; and *Cassel* in the electorate of *Hesse Cassel*, between East and West Prussia. The smaller states next in size to those already named, are *Hesse*

Darmstadt, and north of it *Hesse Cassel*, both north of Baden; *Nassau*, west of Hesse Darmstadt; *Brunswick*, between Hesse Cassel and Hanover; *Oldenburg* nearly surrounded by Hanover; *Mecklenburg Schwerin*, north-east of Hanover; and *Saxe Weimar*, north of Bavaria. The free cities of Germany are Hamburg, Lubec, and Bremen in the north-east; and Frankfort on the Maine.

The empire of *Austria* comprehends the ancient *Vindelicia* and *Rhætia*, in the west; *Noricum*, in the centre; *Pannonia* and part of *Dacia*, in the east; and *Illyricum*, including *Dalmatia*, in the south; besides its possessions in Italy and Germany. Its German possessions, constituting the south-eastern part of Germany, are *Bohemia*, *Moravia*, and the duchy of *Austria*, which gave name to the empire. Its other divisions, at the present day, besides *Lombardy* and *Venice*, are *Tyrol*, in the west; *Illyria*, and *Dalmatia*, in the south; *Styria* and *Carinthia*, in the centre; and the kingdoms of *Galicia*, and *Hungary*, in the east; Hungary, including Transylvania in the extreme east, and *Sclavonia* and *Croatia*, in the south. The *Danube* is its chief river, and it has the *Carpathian* mountains in the east. Its chief cities are *Vienna*, the capital, anciently called *Vindobona; Prague*, in Bohemia; *Presburg*, *Pest* and *Buda*, in Hungary; *Trieste*, in Illyria; and *Lemberg*, in Galicia. The Austrian empire, comprising so many different states, has a great variety of people, and character. The government is one of the most despotic in Europe; but there is religious toleration; though the established religion is the Roman Catholic.

The kingdom of *Prussia* consists of the divisions formerly called *East* and *West Prussia*, and *Pomerania*, bordering on the Baltic Sea; *Posen*, taken from Poland; *Brandenburg* and *Silesia*, in the eastern part of Germany; and *Westphalia* with the *Lower Rhine*, in the heart of Germany, separated from the preceding divisions by Brunswick and other states. It comprehends, therefore, a part of ancient Germany and a part of *Sarmatia*. The Rhine, Elbe, Oder and Vistula rivers, flow through Prussia; and the latter three are connected by canals. The chief cities are *Berlin*, the capital, with *Potsdam*, *Magdeburg* and *Halle* in Brandenburg; *Breslau* in Silesia; *Dantzic*, in West, and *Königsberg*, in East Prussia; *Posen*, in Posen; and *Cologne*, in Cleves, connected with Westphalia. Prussia has been a very warlike nation; but has recently made great progress in education and refinement. The Protestant religion prevails; but there is general religious toleration.

The kingdom of *Denmark*, comprehends the German duchy of *Holstein;* and the peninsula of *Jutland*, which was the ancient *Cimbrica Chersonesus*, or country of the *Cimbri*, *Angli*, *Saxones*, and *Teutones*. The *Faroe* or *Ferroe Islands*, and *Iceland* belong also to Denmark. The chief cities are *Copenhagen*, the capital, and Elsinore; both on the island of Zealand, at the entrance of the Baltic Sea; with *Altona* and *Kiel*, in Holstein. The Danes are a brave, hardy, and enterprizing people.

§ 4. *Northern Europe*, of which we are lastly to speak, has a cold climate, a more barren soil, and a less dense population, than the preceding divisions. The people are hardy, and brave; but comparatively ignorant: and the lower classes, for the most part, live in a comparatively degraded state. Travelling, during the long winters, is performed on sledges, drawn by the reindeer; and this useful animal also supplies the inhabitants partially with food and clothing.

Norway and Sweden, together constituted the ancient *Scandinavia;* and Norway was also called *Nerigonia.* Norway is separated from Denmark by the *Skager Rack* strait; Sweden from Denmark by the *Cattegat;* and they are separated from each other by the *Dofrafield* or Dovrefeld mountains. On the north-west coast are the *Loffoden* islands; south of which is the *Maelstrom*, a vast whirlpool, the roaring of which is sometimes heard at a distance of several miles; and a near approach to which would be dangerous to vessels. Sweden contains the lakes *Wener*, *Wetter*, and *Malar;* but its rivers are small, and of little note. The chief cities of Sweden, are *Stockholm*, the capital; and in the south, *Gottenburg* and *Carlscrona:* those of Norway, are *Christiania*, and *Bergen*, in the south; and *Drontheim*, farther north. Norway is subject to Sweden: but governed by a viceroy and local legislature.

Russia comprehends the greater part of the ancient *Sarmatia;* including *Finland*, between the Gulfs of *Finland* and *Bothnia; Lapland*, in the extreme north, with the islands of *Spitzbergen* and *Nova Zembla;* and in the south-west or west, the greater part of *Poland*, which forms a nominal kingdom, but is subject to the emperor of Russia as its king. The little *Republic of Cracow*, having *Cracow* for its capital, is the only part of Poland which remains nominally independent. Russia has the large lakes *Ladoga* and *Onega;* and the river *Dwina* with the *White Sea*, in the north; and the rivers *Volga*, *Don*, *Dnieper* and *Dniester*, in the south. The Volga, or Wolga, flows into the Caspian; and the Don into the Sea of Azoph; but the two last named rivers flow directly into the Black Sea. The Canal of Vishnei Volotchoc establishes a navigable communication between the Baltic and Caspian Seas. The chief cities of Russia, are *St. Petersburg*, the capital, *Cronstadt* being its outport; *Moscow*, the former capital; *Warsaw*, in Poland; *Wilna*, in Lithuania; *Riga*, in Livonia; *Odessa* and *Kiev*, in the south; *Kazan*, in the east; *Archangel*, in the north; and *Abo*, in Finland. The Russians generally are still inferior to central and western Europe in all the elements of civilization.

CHAPTER III.

AFRICAN GEOGRAPHY.

Africa, united to Asia by the *Isthmus of Suez*, is the least enlightened and the least known of all the grand divisions of the earth. Egypt was inhabited and cultivated at a very early period: Ethiopia, south of it, was well known to the ancients; and Carthage was settled by Phœnician colonists as early as 869 B. C.: but of central and southern Africa nothing was known until modern times. Herodotus indeed states that Pharaoh Necho sent a Phœnician fleet, which sailed around Africa, 604 B. C.; but the statement has been justly doubted. The more southern coasts of Africa were first explored by the Portuguese, led on by the Infante, Prince Henry, after their successes in Barbary. *Zarco* discovered Madeira in 1419; *Gilanez* doubled cape Bojador in 1433; *Noel* discovered the Cape Verde islands in 1446; *Escovar* coasted Guinea, and discovered Prince's Island in 1471; *Diego Cam* reached the river Zaire or Congo in 1484: and *Bartholomew Diaz* reached the southern cape of Africa, which he called the Cape of Storms, in 1486; but his sovereign, John II., changed its name to Good Hope. *Vasco de Gama* first sailed around that cape, coasted as far as Melinda, and thence obtaining Arabian pilots, proceeded to Calicut, in Hindoostan, in 1498; thus opening a southern passage to India. *Madagascar* was afterwards discovered by the Portuguese in 1506 or 7. Central Africa has been partially explored by the travels of *Bruce* in Abyssinia, in 1768; of *Mungo Park*, in Bambara and Timbuctoo, in 1796; of *Oudney* and *Denham* to Bornou, and *Clapperton* to Houssa, in 1823; and of *Richard* and *John Lander*, who in 1830 traced the river Niger or Quorra, to its mouth, in the Gulf of Guinea. There have been numerous other travellers in Africa, whom we have no room here to mention.

The following table presents the nearest approximation which we can make to an estimate of the extent and population of Africa.

Countries.	*Sq. Miles.*	*Inhabitants.*	*Countries.*	*Sq. Miles.*	*Inhabitants.*
Egypt	180,000..	2,500,000	Lower Guinea.	700,000..	6,000,000
Barbary.......	700,000..	14,000,000	Ethiopia	2,000,000..	10,000,000
Sahara........	2,500,000..	300,000	South Africa...	600,000..	1,000,000
Nubia	350,000..	1,700,000	Mozambique...	400,000..	2,000,000
Abyssinia	300,000..	3,500,000	Zanguebar	500,000..	3,000,000
Nigritia.......	1,600,000..	18,000,000	African Islands	200,000..	3,000,000
Senegambia ...	350,000..	8,000,000			
Upper Guinea.	500,000..	7,000,000	TOTAL........	10,880,000	80,000,000

We proceed to treat of the divisions of Africa, in the order above named.

§ 1. *Northern Africa*, including Sahara, is the only part which is yet generally elevated above a savage state. It is a land of historic fame, including the ancient states of Egypt, Carthage, and Numidia; but it is now inhabited chiefly by Arabs, mingled with Negroes; among most of whom the Mohamedan religion prevails. It is a very hot region, owing partly to the deserts which it contains; but the northern parts are fertile in date palm trees, and other tropical productions.

Egypt retains its ancient name, and the ruins of its former greatness. It was anciently divided into *Ægyptus Inferior*, in the north, including the *Delta* between the mouths of the *Nile*; *Heptanomis*, or the middle part; and *Thebais* or *Ægyptus Superior*, in the south. Among its cities were *Alexandria*, the new capital, in the north-west; *Pelusium*, in the north-east; *Memphis*, the old capital, near the Pyramids; and *Ptolemais*, and *Thebæ* or *Thebes*, the most ancient capital, in Upper Egypt. The chief modern cities are *Cairo* or *Grand Cairo*, the present capital, near the ancient Memphis; and *Alexandria* and *Damietta*. Egypt is fertilized by the inundations of the river *Nile*, beyond the borders of which it is mostly a desert. It is ruled by a *Pacha*, with absolute power. The most interesting objects in this country, are the Pyramids, near Grand Cairo, and the remains of the ancient temples and tombs, at Thebes, and elsewhere in Upper Egypt.

Barbary, occupies the northern border of Africa, from Egypt to the Atlantic Ocean; and comprehends the states of *Tripoli*, in the east; *Tunis* and *Algiers*, central; and *Morocco*, in the west; besides the region called *Biledulgerid*, or Beled-el-Jerid, south of the *Atlas Mountains*. The name of *Moors*, derived from the ancient Mauritania, belongs properly to the people of Morocco; but is often applied to the people of Barbary generally. *Tripoli*, is the *Tripolitana* of the Romans; and includes *Barca*, the ancient *Libya*, on the east; and *Fezzan*, the great oasis, to the south; both of which are tributary to Tripoli proper. *Libya* comprehended *Cyrenaica*, along the coast, so named from its chief city, *Cyrene*. The present cities of Tripoli, are, besides Cyrene, *Tripoli*, the capital; *Derne*, in Barca; and *Mourzouk* in Fezzan. The Pacha of Tripoli, is still tributary to Turkey. *Tunis*, is the country of ancient *Carthage;* to which the name *Africa* was originally confined. Its chief city and capital is *Tunis*, near the site of *Carthage*, and east of ancient *Utica*. The Bey of Tunis is also tributary to the Turkish Sultan.

Algiers comprehends the ancient *Numidia*, and part of *Mauritania*. Its chief cities are *Algiers*, the capital; *Constantine* and *Bona*, in the east; and *Oran*, in the west. Algiers was recently conquered by France, and is now a French colony, held by military force. *Morocco*, the ancient *Mauritania*, includes Fez, in the north; *Tafilet*, in the east; and *Suse*, in the south-west; all of which were formerly independent, but are now tributary to the Moorish emperor. The chief cities of this small empire, are, *Morocco*, the capital; *Fez* and *Mequinez*, in the north; and *Mogadore*, on the western coast. The emperor is a despotic and independent sovereign; whose political strength is said to be declining. *Biledulgerid* or Bled-el-Jereed, so named from its being the land of the date palm tree, lies south of Algiers and Tunis; extending to the great desert. *Tuggurt*, is one of its chief towns; but the inhabitants are principally roving Arabs.

Sahara, or *Zaara*, often called the *Great Desert*, extends from the Atlantic Ocean, to the borders of Egypt and Nubia, including *Fezzan*, and other *oases*, or fertile spots, like islands, in an ocean of sand. The part of it east of Fezzan, is called the *Libyan Desert*, and the whole was anciently called *Deserta Libyæ Interioris*. It is nearly 3000 miles long, and 1,000 wide; and is inhabited only by tribes of wandering Arabs, who travel over it in caravans, on camels; living partly by merchandize, and partly by plunder.

Nubia, is a part of the ancient *Ethiopia*, like Egypt, partly watered by the Nile, and partly a sandy desert. It comprehends the petty kingdoms of *Dongola*, in the north, and *Sennaar*, in the south; each deriving its name from its capital city. The northern part of Nubia is said to be subject to Egypt. *Abyssinia*, is also a part of ancient *Ethiopia;* the southern and western boundaries of which were undefined. Abyssinia contains the eastern sources of the Nile; and the *Bahr-el-Abiad* or main source may be regarded as its western boundary. This country was formerly united under one government; but now comprises three independent states; *Amhara*, in the north-west; *Tigre*, in the north-east; and *Shoa Efat*, in the south. *Gondar*, the former capital, is now the capital of Amhara; and *Adowa*, is that of Tigre; but Shoa Efat, has no large town, and has been partly subdued, by the savage *Gallas*, from the south. The religion of Abyssinia, is nominally the Christian; but very much corrupted.

§ 2. We now come to that part of Africa, which is inhabited almost exclusively by the Negro race; and shall commence with the portion next south of Sahara, a part of which has been penetrated, by the Arabs, and exhibits some traces of their language and religion. *Nigritia* or Negroland, extends from Senegambia on the west, to Nubia and Abyssinia on the east; the central and western portions being also known by the name of *Soudan*. It comprises a large number of petty kingdoms or states; some of which are *Bergoo*, *Darfur*, *Kordofan*, and *Fertit*, in the east; *Darkulla*, *Bornou*, *Mandara*, *Houssa*, and *Yarriba*, central; *Timbuctoo*, (or Tombuctoo), *Bambarra*, and *Kaarta*, in the west. Among the cities, are *Kemmoo*, in Kaarta; *Sego*, in Bambarra; *Timbuctoo*, in Timbuctoo; *Soccatoo*, or Sackatoo, in Houssa; *Bornou*, in Bornou; *Wara*, in Bergoo; and *Cobbe*, in Darfur. The Niger is the chief river, running first eastward, then southward into the Gulf of Guinea. The more eastern tribes are professed Mohamedans, and slightly civilized; but the *Fellatahs*, in the central part, are barbarous and warlike.

Under the name of *Western Africa*, we comprehend all the countries on the western coast, from Sahara to the tropic of Capricorn. This is the region in which the *Slave Trade* has mostly prevailed; a horrid traffic, which philanthropy has not yet been able fully to suppress: though much has already been done by the establishment of enlightened and well governed colonies, on this benighted coast. *Senegambia*, so named from its two principal rivers, the *Senegal* and *Gambia*, is the land of the *Jaloffs*, or Yoloffs, in the north; the *Foulahs*, (or Foolahs), in the south; and the *Mandingoes*, in the interior; which races are intermediate between the Moors and Negroes. *Sierra Leone*, in the south, is a British colony, and an asylum for Negroes liberated from slave-ships. *Freetown*, is its capital. The French have settlements at *St. Louis*, near the mouth of the Senegal; and the Portuguese, at the mouth of *Rio Grande*, a small river in the central part.

Upper Guinea, called also *Guinea*, or the coast of Guinea, extends along the coast, eastward, to the mouths of the *Niger*; and includes the colony of *Liberia*, in the west; with the negro states of *Ashantee*, and *Dahomey*, in the centre; and *Benin*, in the east. The *Grain Coast*, belongs to Liberia; the *Ivory* and *Gold Coasts*, to Ashantee; and the *Slave Coast*, to the more eastern states. *Liberia* is settled by emancipated slaves, under the direction of the American Colonization Society, and now contains 5000 colonists, besides 30,000 natives, whose situation is rapidly improving, under its republican government, and Christian institutions. Its capital is *Monrovia*. The chief town of Ashantee, is *Coomassie*; that of Dahomey, is *Abomey;* and Benin has a capital bearing its own name. The British have some settlements on this coast.

Lower Guinea, may be considered as extending from the eastern mouth of the Niger, to the tropic of Capricorn, along the western coast of Africa. It includes the negro states of *Biafra* and *Calbongas*, in the north; *Loango*, *Congo*, *Angola*, and *Benguela*, more central; and *Cimbebas*, which is partly a desert, in the south. It has the *Crystal* mountains in the east; and the *Congo*, or *Zaire*, is its largest river. *Loango* and *Benguela*, have capitals of their own name; that of Congo, is *St. Salvador*, or *Banza Congo;* and the Portuguese occupy *Loando*, in Angola, for the purchase of slaves. The religion of both Upper and Lower Guinea, is paganism, the governments are despotic; and the people very degraded. The climate of the preceding parts of Africa is intensely hot, and in many places unhealthy to Europeans; but the productions are numerous; including the baobab, a kind of bread-tree; and among the animals of this region are, the lion, tiger, elephant, rhinoceros, hippopotamus, giraffe, zebra, and ostrich.

§ 3. We proceed next to the more southern and eastern parts of Africa; commencing with *Ethiopia;* of which we can only say, that it is a vast region, extending from the *Jibbel-el-Kumri*, or Mountains of the Moon, on the north, to the tropic of Capricorn on the south; but it is, as yet, almost entirely unknown to the civilized world. *Cazembe*, is said to be a considerable state in its southern part. The name *South Africa*, is applied to that part of Africa which lies south of the tropic of Capricorn: including the British *Colony of the Cape*, in the south; the country of the *Hottentots*, in the middle and west; and *Caffraria* and *Bushuana*, in the east. Its chief river is the *Orange*, running westward, through the Hottentot region. The chief towns are, *Cape Town*, in the Cape Colony; and *Lattakoo*, and *Kurreechane*, in Boshuana. The Cape Colony was first settled by the Dutch, but taken by the English in 1795, and again in 1806. The Hottentots, including the *Damaras*, *Namaquas*, and *Bushmen*, are an extremely barbarous and degraded people. South Africa is the coolest, and perhaps the most healthy portion, which has yet been explored, of this quarter of the globe.

Eastern Africa, may be considered as extending from the tropic of Capricorn, or *Delagoa Bay*, northward to the strait of *Babelmandel;* and it may be divided into the coast of *Mozambique;* and that of *Zanguebar;* the latter including Ajan. The inhabitants are mostly of the African race; governed by petty chiefs; and many of them profess the Mohamedan religion. The *Coast of Mozambique*, extending north to *Cape Delgado*, includes the small states of *Inhambane*, *Sofala*, *Mocaranga*, and *Mosambique*, on the coast; and *Monomotapa*, in the interior. The Cuama, or *Zambeze*, is its principal river; and its chief towns are, Inhambane, Sofala, *Quilimane*, and *Mosambique*, all of which are subject to the Portuguese. The *Maravis*, and the *Bo~roras*, are the principal tribes, scattered through the interior.

The *Coast of Zanguebar*, extends northward from Mozambique; and includes the states of *Quiloa* and *Mombas*, in the south;

and *Melinda* and *Magadoxa*, in the north. All of these states are named from their chief towns; but Magadoxa, is the chief place of trade, supplying ivory, myrrh, and frankincense. The name *Somaulia*, may be applied to the remaining eastern coast of Africa, extending from Magadoxa to Cape Guardafui, and thence to Abyssinia. It comprises *Ajan*, in the south-east: and *Berbora*, and *Adel*, in the north and north-west. Berbora, is so named from its chief town; and Zeyla, in Adel, on the straits of Babelmandel, is also a place of trade. The *Somaulies*, on the coast, and the *Gallas*, in the interior, are the leading native tribes; in a very savage state.

§ 6. The *African Islands*, are numerous, but subject mostly to European powers. *Madagascar*, the largest, is inhabited by Arabs, Malays, and Negroes; and divided into several small states. *Tananarivou*, the capital of *Imerina*, in the central part, is probably the largest town. Of the adjacent islands, *Mauritius*, on the east, and the *Almirante*, and *Seychelle Islands*, to the north-east, belong to Great Britain; but *Bourbon*, near Mauritius, belongs to France. That part of the Indian Ocean, which surrounds these islands, is known as the *Ethiopian Archipelago*. Of the islands west of Africa, the *Canaries* belong to Spain; *Santa Cruz*, on *Teneriffe*, being their chief town. The *Azores* or Western Islands, the *Madeiras*, the *Cape Verdes*, *St. Matthews*, and *Ascension*, belong to Portugal; and *St. Helena*, to the British.

CHAPTER IV.

NORTH AMERICAN GEOGRAPHY.

North America, colonized chiefly by the English, and Spaniards, now ranks next to Europe, in civilization, science, and improvements. It was unknown to the civilized world, until comparatively recent times. Greenland, was discovered by the Icelanders, as early as A. D. 982; and either Newfoundland or New England, appears to have been discovered by *Biorn*, (or Bjorn), a Norwegian, in 1002, under the name of *Vinland*, or wine-land. It is also supposed that the brothers *Zeno*, (the Zeni), of Venice, discovered the same region, which they called *Estotiland*, in 1390; but still, the existence of a western continent was not believed in, by the civilized world, until *Christopher Columbus*, of Genoa, under Spanish patronage, discovered Guanahani, since called St. Salvador, or Cat Island, one of the Bahamas, in 1492. In the same year, he discovered Cuba and St. Domingo: in his second voyage, Jamaica; and in his third voyage, in 1497, he discovered Trinidad, and the contiguous coast of South America; of which we are again to speak.

In the year last mentioned, 1497, *John Cabot*, and his son Sebastian, sent by Henry VII. of England, in search of a north-west passage to India, discovered Nova Scotia and Newfoundland; and the latter, in a second voyage, in 1498, coasted southward as far as

Florida. In 1513, *Balboa* or Balbao, crossing the Isthmus of Darien, discovered the Pacific Ocean, and thus ascertained that America was separated from Asia. Florida was explored by *Ponce de Leon*, in 1512; and Mexico by *Cortez*, in 1519. The attempt to discover a north-west passage to India, was repeated, in 1576, by *Frobisher*, who discovered Frobisher's Straits; in 1585, by *Capt. John Davis*, who discovered Davis' Straits; in 1610, by *Capt. Henry Hudson*, who discovered Hudson's Straits and Bay; in 1616, by *Capt. Baffin*, who discovered Baffin's Bay, and Cumberland Island, now Prince William's Land; and more recently, in 1818, by *Capt. Ross*, who penetrated Lancaster's Sound; and again in 1819, by *Lieut. Parry*, who wintered at Melville Island, and whose progress in that direction has not since been surpassed. The expedition of Parry and Lyon to the northern part of Hudson's Bay, in 1821–3, was unsuccessful.

Meanwhile, the Spaniards under Cortez discovered California, in 1536; and the North West coast, which is said to have been visited by *Mendana*, in 1595, was explored by *Carteret*, in 1767; by *Cook*, in 1778; and by *Vancouver*, about 1794. In 1771, *Mr. Hearne* discovered the Arctic Ocean at a point south of Melville Island; and in 1789, *Mackenzie*, who first crossed the Rocky Mountains and reached the Pacific by land, discovered Mackenzie's River, and the sea at its mouth. *Sir John Franklin* and *Dr. Richardson*, in 1826, explored the northern coast of America, from Bathurst Inlet, and Hearne's discoveries, westward to those of Mackenzie; and thence westward to Point Beechey. Messrs. *Dease* and *Simpson*, in 1837, completed the exploration from Point Beechey to Behring's Straits; and in 1839, they explored the coast eastward, from Bathurst Inlet, to Cape Britannia, (Lat. 68° 4′ N.; Lon. 94° 35′ W.), near which their progress was interrupted by the lateness of the season. It is now rendered nearly certain that Greenland, and the North Georgian Islands, are separated from the continent of America, though closely contiguous to it. Of numerous expeditions to the central parts of North America, we have no farther room to speak.

The following is the nearest estimate which we can make of the extent and population of the countries of North America.

Countries.	*Sq. Miles.*	*Inhabitants.*
Greenland......	600,000..	20,000
Russian America	500,000..	50,000
New Britain....	2,660,000..	300,000
British Provinces	435,000..	1,380,000
United States...	2,300,000..	17,500,000
Texas	200,000..	150,000
Mexico	1,550,000..	8,000,000
Central America	200,000..	2,000,000
West Indies....	90,000..	3,000,000
TOTAL.........	8,535,000	32,400,000

Of these divisions we proceed to treat, commencing at the north.

§ 1. The *Northern Division* of North America, is mostly cold, barren, and thinly inhabited. It is valuable to the civilized world chiefly on account of the Fur trade, carried on by the whites with the Indians. In this division we include *Greenland;* though it is now almost certain that the region, so named, does not belong to the continent of America, but is only to be regarded as a large contiguous island. Greenland belongs to Denmark; but it is of very little value.

It is inhabited by a few *Esquimaux* Indians, and Danish colonists, who have settlements on the western coast. There are Moravian missions at *Lichtenfels*, *New Hernhut* and other places; but Paganism still prevails. The coasts of Greenland are occasionally visited, in the summer, by ships, in pursuit of whales and seals, and the oil of the former, and skins of the latter, supply the natives, in part, with food and clothing.

Russian America includes that portion which lies west of the 141st degree of west longitude; and the Russians lay claim to the coast as far south as 54° 40′ of north latitude. This territory includes the peninsula of *Alaska*, and the *Aleutian* or *Fox Islands*, sometimes called the Northern Archipelago. The principal settlement is said to be *Sitka* (Sitcha) or *New Archangel*, on one of the islands of the Georgian Archipelago, south of Mounts *St. Elias* and *Fairweather*. A few of the inhabitants are Russians; and the rest, *Esquimaux* Indians, in a barbarous state, subsisting chiefly by hunting and fishing. These possessions are valuable to Russia chiefly on account of the fur trade, which is carried on there, to a great extent, with the Indians.

British America, comprehends New Britain, and the five *Provinces* of Canada, New Brunswick, Nova Scotia, Prince Edward's Island, and Newfoundland. Each of these provinces has a Lieutenant Governor, Executive Council, and Legislative Assembly; and the whole is under a Governor General, appointed by the British Crown. *New Britain* comprises the whole country extending from Russian America, eastward, around Hudson's Bay, to Baffin's Bay, and the Atlantic Ocean. The eastern coast, bordering on the Atlantic, is called *Labrador;* and the region between this and Hudson's Bay is called *East Main;* while the region west of Hudson's Bay is termed *New South*, and *New North Wales*. New Britain is traversed by the *Rocky Mountains;* and contains *Mackenzie's River*, which flows northward from *Slave Lake*, receiving the waters of *Lake Athapescow* (or Athabasca); and *Nelson River*, which flows from *Lake Winnipeg*, north-eastward into Hudson's Bay. *Prince William's Land*, north of Hudson's Strait, as also Boothia Felix, farther west, and the *North Georgian Islands*, including Melville Island, may be considered as a part of New Britain. Among the places of trade, are Forts *Albany*, *Severn*, *York*, and *Churchill*, on Hudson's Bay. Among the Indian tribes which inhabit this region, are the *Esquimaux*, in the north and east; the *Chippewayans* towards the west; and the *Knisteneaux* in the more southern and central parts. New Britain is attached to the government of Lower Canada; and it is the seat of an extensive fur trade, carried on by the Hudson's Bay Company, with which the old North West Company is now united.

Of the *Five Provinces*, above named, constituting the more important part of British America, the *St. Lawrence* is the chief river; and the lakes *Superior*, *Huron*, *St. Clair*, *Erie*, *and Ontario*, form a part of their southern boundary; lying between Canada and the United States. The extent and population of these provinces, is nearly as follows:

Provinces.	Sq. Miles.	Inhab.	Provinces.	Sq. Miles.	Inhab
Upper Canada*	100,000	400,000	Nova Scotia	18,800	160,000
Lower Canada*	250,000	600,000	Prince Edward's Is.	2,200	40,000
New Brunswick	28,000	140,000	Newfoundland	36,000	80,000

Prince Edward's Island, was formerly called St. Johns; but the name was changed, when it became a distinct province. The island of *Cape Breton*, is attached to Nova Scotia; and *Anticosti*, to Lower Canada. The chief towns in these provinces, are, of Upper Canada, *Kingston*, and *Toronto*, formerly called York; of Lower Canada, *Quebec*, and *Montreal;* of New Brunswick, *Frederickton*, the capital, and *St. Johns;* of Nova Scotia, *Halifax;* of Prince Edward's Island, *Charlotte Town;* and of Newfoundland, *St. Johns.* The inhabitants of Lower Canada, are chiefly of French descent, and Catholics; but the other parts were mostly settled by the British. The chief trade is in timber and furs.

§ 2. The *United States of America*, comprise, at present, twenty-six states, and three organized territories; besides the district of *Columbia*, and the extensive western region, still inhabited by the aborigines or *Indians.* The principal mountains are, the *Rocky*, or Chippewayan, in the west; and the *Alleghany* range in the east; besides the White Mountains, Green Mountains, Catskill Mountains, Blue Ridge, Laurel and Chesnut Hills, and the Cumberland Mountains. The largest rivers are, the *Mississippi*, with its tributaries, the *Missouri*, *Ohio*, *Arkansas*, and *Red River;* which together discharge the waters of the great central basin into the Gulf of Mexico; and the *Columbia River*, in the extreme west, flowing into the Pacific Ocean. On the eastern coast, are the Penobscot, Kennebec, Connecticut, Hudson, Delaware, Susquehanna, Potomac, James, Roanoke, Pedee, Santee, Savannah, and Alatamaha, or Altamaha; and into the Gulf of Mexico, flow the Apalachicola, Alabama, Pascagoula, and Pearl rivers. The Tennessee, Cumberland, and Wabash, flow into the Ohio; and the Kaskaskia, Illinois, and Wisconsin, into the upper Mississippi. The *St. Lawrence*, is the outlet of the large lakes, mentioned under the British Provinces; as also of lakes *Michigan*, and *Champlain*, which lie wholly within the United States. *Long Island*, the largest belonging to the United States, is a part of New York.

The largest cities, in the United States, are *New York*, *Philadelphia*, *Baltimore*, *Boston*, and *New Orleans;* and next to these in size, are *Cincinnati*, *Pittsburg*, *Charleston*, and *Albany.* New York, containing 300,000 inhabitants, is the largest city in America. The Canals and Railroads of the United States, are too numerous to be here mentioned; but the total length of the former now completed, is not less than 2,500; and of the latter, 3,500 miles; besides about 135,000 miles of common post roads. The annual revenue is 20 or 25 million dollars; the exports about 110 millions; and the imports about 120 millions of dollars. There are in the United States about 880 banks, including branches, with an authorized capital of 440

* These two provinces, the boundary between which was the Utawas River, were united in one, on the 10th of February, 1841; Kingston being now the seat of Government.

million dollars; and the total wealth of the nation may be estimated at not less than seven times that amount. The army now consists of nearly 12,000 men: and the navy of 62 vessels. The government is representative and republican, as already described, (p. 111); and the religion is chiefly protestant, of various denominations. There are now about 95 Colleges in operation in the United States; besides Academies, and Common Schools. The number of Indians in the U. S., chiefly in the Western Territory, cannot be less than 500,000; and they are divided into almost innumerable tribes; of which the *Cherokees*, *Creeks*, and *Choctaws*, are perhaps the most civilized and best known.

The following is a table of the extent of the several states, with their population, in 1830, and in 1840; and their capitals.

States.	*Sq. Miles.*	*Pop. in* 1830.	*Pop. in* 1840.	*Capital.*
Maine,	33,000	399,955	501,793	Augusta.
N. Hampshire,	9,400	269,328	284,574	Concord.
Vermont,	10,210	280,652	291,948	Montpelier.
Massachusetts,	7,600	610,408	737,699	Boston.
Rhode Island,	1,350	97,199	108,830	Providence & Newport.
Connecticut,	4,700	297,665	310,015	Hartford & N. Haven.
New York,	46,000	1,918,608	2,428,921	Albany.
New Jersey,	7,500	320,823	373,306	Trenton.
Pennsylvania,	44,000	1,348,233	1,724,022	Harrisburg.
Delaware,	2,100	76,748	78,085	Dover.
Maryland,	13,000	447,040	469,232	Annapolis.
Virginia,	64,000	1,211,405	1,239,797	Richmond.
N. Carolina,	50,000	737,987	753,110	Raleigh.
S. Carolina,	29,000	581,185	594,398	Columbia.
Georgia,	60,000	516,823	750,000*	Milledgeville.
Alabama,	50,000	309,527	660,000*	Tuscaloosa.
Mississippi,	46,000	136,621	375,651	Jackson.
Louisiana,	48,500	215,739	351,176	New Orleans.
Arkansas,	55,000	30,388	95,642	Little Rock.
Tennessee,	40,000	681,904	829,210	Nashville.
Kentucky,	40,000	687,917	800,000*	Frankfort.
Ohio,	39,000	937,903	1,519,467	Columbus.
Michigan,	44,000	31,639	211,705	Detroit.
Indiana,	36,000	343,031	683,314	Indianapolis.
Illinois,	54,000	157,455	474,404	Vandalia.
Missouri,	62,000	140,445	381,102	Jefferson City
D. of Columbia,	100	39,834	43,712	WASHINGTON.
Florida T.,	50,000	34,730	54,207	Tallahassee.
Wisconsin T.,	90,000	- -	30,752	Madison City.
Iowa T.,	180,000	- -	43,068	Burlington.
	1,216,460	12,861,192	17,199,140	

Missouri, *Oregon*, and the *Indian* Territory, have no organized territorial governments.

Texas, formerly belonging to Mexico, has been mostly settled by emigrants from the United States. Its chief river, is the *Brazos;* and its principal towns, are *Houston*, the late capital; *Austin*, the new capital; both centrally situated; and *Nacogdoches*, and *Matagorda*, in the east. The government is republican; and the population rapidly increasing.

§ 3. The *Southern Division* of North America, including Mexico, and Central America, was colonized by the Spaniards; and

* Returns incomplete.

retains their language, with the Roman Catholic religion. The governments are now republican; but these countries are in an unsettled state; and education is not generally diffused, though much needed, for their improvement.

Mexico, formerly called New Spain, includes the peninsulas of *Yucatan*, in the south-east, and *California*, in the west. It is traversed by the great American chain of mountains, here called the *Cordilleras;* and its chief rivers, are the *Del Norte*, and *Western Colorado;* the latter flowing into the Gulf of California. The *Great American Desert*, lies east of the Rocky Mountains, partly in Mexico, and partly in the United States; and the *Great Sandy Desert*, is in the north-western part of Mexico. The chief cities of this country, are *Mexico*, the capital; *Puebla*, south-east of it; *Guanaxuato*, and *Guadalaxara*, north-west of it; *San Luis Potosi*, and *Oaxaca*, south of Puebla: and the principal sea-ports, are *Vera Cruz*, and *Tampico*. Mexico is celebrated for its gold and silver mines; many of which are now neglected. The antiquities of this country, and particularly the pyramid of Cholula, and the ruins of the ancient city Calhuacan, near Palenque, attest the power and civilization of its former inhabitants. The government of Mexico, is nominally republican; but controlled for the most part by military force. Yucatan has recently become a separate and independent republic, of which Merida is the capital. The settlement of *Balize*, on the Bay of *Honduras*, belongs to the British.

Guatimala, now called *Central America*, extends southward to the isthmus of *Darien;* and contains the *Lake Nicaragua;* with some volcanoes, in the *Cordillerian* range of mountains. Its chief cities, are *St. Salvador*, the capital; *Guatimala*, and *Leon*. The climate is hot, and less healthy than on the table lands of Mexico. Its most valued productions are logwood, mahogany, indigo, and cochineal; but here, as in Mexico, the country is not highly cultivated.

§ 4. The *West Indies*, are a numerous group of islands, so named from the supposition of Columbus, that they were a part of the Indies known in preceding times. They are all, excepting Hayti, subject to different European powers; and their commerce is of much value. The four largest islands, Cuba, Hayti, Jamaica, and Porto Rico, are known as the *Great Antilles*. The names Lesser Antilles, and Caribbee Islands, are variously applied to the islands south and east of these; but we prefer to call them all *Caribbee Islands*, including the *Windward*, or more eastern, and the *Leeward*, or more western.

Hayti, Hispaniola, or St. Domingo, is now occupied by Africans, having a distinct and independent government, under a president, chosen for life. Its chief towns, are *Port au Prince*, and *Cape Haytien;* the latter being the capital. *Cuba*, and *Porto Rico*, are still subject to Spain. Their chief towns, are, in Cuba, *Havana*, and *Puerto Principe;* and in Porto Rico, *St. Johns*. The interior of Cuba, being mountainous, has a cool and healthy climate, though within the torrid zone.

The British possessions in the West Indies, are *Jamaica;* and Trinidad, Tobago, Grenada, Barbadoes, St. Lucia, Dominica, Antigua, the *Bahamas*, and *Bermudas*, with several smaller islands.

The capital of Jamaica is *Kingston:* but the other towns of these islands, are too small to find mention in this place. Slavery has recently been abolished in the British West Indies; but in Cuba, and Porto Rico, it still continues to exist. *Guadaloupe*, and *Martinico*, belong to the French; *St. Eustatia*, *Curaçoa*, and *St. Martin's*, to the Dutch; *Santa Cruz*, *St. Thomas*, and *St. Johns*, to the Danes, and *St. Bartholomew*, *Mariegalante*, and *Deseada*, to the Swedes.

CHAPTER V.

SOUTH AMERICAN GEOGRAPHY.

South America, colonized by the Spaniards and Portuguese, was, like the preceding grand division, made known to the civilized world by the genius and labors of Columbus. He was its first European discoverer, and first visited it, as before mentioned, in 1497. In the year 1500, *Alvarez Cabral*, when on his way to the East Indies, under the orders of the Portuguese government, discovered the coast of Brazil. The river La Plata, is said to have been discovered in 1512; but the more southern part of South America, was first explored by *Magellan*, in 1520, under Spanish authority, and on his voyage around the world, the first which was ever made. In 1524, Peru became known to the Spaniards, which led to its conquest by Pizarro, begun in the following year. Buenos Ayres, was visited by *De Solis*, in 1517; and by *Sebastian Cabot*, in 1526. Chili, was invaded by *Almagro*, in the year 1535. We have only room to add, that *Orellana*, or Ovellana, a Spaniard, is regarded as the discoverer of the river Amazon, and the region of Amazonia, about the year 1541.

The following is offered as an approximate statement of the extent and population of the countries of South America.

Countries.	Sq. Miles.	Inhabitants.	Countries.	Sq. Miles.	Inhabitants.
Brazil	3,200,000	5,200,000	Chili	170,000	1,500,000
Guiana	160,000	180,000	La Plata	750,000	2,000,000
Venezuela	420,000	900,000	Paraguay	100,000	300,000
New Grenada	450,000	1,700,000	Uruguay	110,000	150,000
Equador	300,000	600,000	Patagonia	380,000	40,000
Peru	440,000	1,700,000			
Bolivia	450,000	1,600,000	Total	6,930,000	15,870,000

We proceed to speak of these divisions, in the order above named.

§ 1. The *Eastern Division* of South America comprises Brazil and Guiana, colonized by other nations than the Spaniards. The climate of this region is hot, and in some parts unhealthy; but it has generally a fertile soil, and produces cotton, coffee, sugar, rice, maize, Brazil wood, and various tropical trees and plants. Among the animals of this region, are the jaguar, or American tiger, the tapir, resembling the African hippopotamus; and the large aboma snake, almost vieing with the East India anaconda.

Brazil, is an extensive, though thinly peopled empire; and nominally includes the central region of South America, called *Amazonia*, still chiefly inhabited by the Indians. Indeed, various Indian tribes are scattered over all its wide territory : but these we have no room to name. It is watered by the *Amazon* in the north, with its branches, the *Negro*, *Madeira*, *Topayos* or Tapajos, and *Xingu* or Chingu : in the central part is the *Araguay* or *Tocantins ;* and, in the east, the river *St. Francisco.* The *Brazilian* mountains extend along the south-eastern coast. The chief cities of this empire are *Rio Janeiro*, the capital ; *Bahia*, or *St. Salvador*, and *Pernambuco*, farther north ; and between the two latter *Sergippe del Rey*, all in the eastern part ; *Cuyaba*, in the centre ; *Para* and *Maranham*, in the north ; and *St. Paul*, in the south. Brazil has rich mines, especially of gold and diamonds. It was formerly a Portuguese colony, but is now an independent monarchy ; and the religion is the Roman Catholic.

Guiana, north of Brazil, is now limited to the *French*, *Dutch*, and *British* possessions of that name ; the part which formerly belonged to Portugal, being now merged in Brazil. *Cayenne* is the capital of Cayenne, or French Guiana ; *Paramaribo*, of Surinam or Dutch Guiana ; and *Georgetown* is the capital of Berbice, Demerara, and Essequibo, or British Guiana. The commerce of this region is of some value ; but owing perhaps to the climate the people are said to be indolent ; and the greater part of the population are slaves.

§ 2. The countries in the *North Western Division* of South America, were all colonized by Spain ; and though now independent, retain the Spanish language and manners, with the Roman Catholic religion. Their governments are all nominally republican ; but imperfectly administered, from the want of general education and knowledge among the people.

Venezuela, is a part of the recent republic of *Colombia*, which included also New Grenada and Equador. Its chief river is the *Orinoco ;* the island of *Margarita* belongs to this state ; and Lake *Maracaybo* is near its western border. Its chief cities, are *Caraccas*, the capital ; *Maracaybo*, *Coro*, and *Valencia*, west of it, and *Cumana*, farther east. Venezuela produces domestic animals, sugar, and cocoa, in great abundance ; and the inhabitants are said to be making considerable progress in education and the arts. *New Grenada*, recently a part of Colombia, and now an independent republic, is rich in the productions of all climates, and has mines of gold and silver. It is traversed by the *Andes* mountains, on which its climate is cool, though in the torrid zone. The *Magdalena* is its principal river ; and its chief towns are *Bogota*, (Santa Fé de Bogota), the capital ; *Popayan*, south of it ; and *Carthagena*, and *Panama*, in the north and west. Coffee, cotton, indigo, and tobacco are among its productions ; but agriculture and the arts are in a backward state.

Equador, (Ecuador or Equator), the remaining part of Colombia, and now independent, borders on the Pacific Ocean, and lies chiefly south of the equator, from which it derives its name. It contains *Chimborazo* and numerous other lofty peaks of the Andes, some of which, including *Cotopaxi*, are volcanoes. In its eastern part, the rivers *Ucayale* and *Tunguragua* unite to form the Amazon ; and the *Yupura* or *Caqueta* forms a part of its northern boundary. Its chief cities, are *Quito*, the capital; and south of it, *Guayaquil*, *Riobamba*, and *Cuenca*. Its productions and characteristics are nearly the same as those of New Grenada. *Peru*, south of Equador, is also traversed by the Andes, and contains the river *Ucayale*, the chief source of the Amazon. Lake *Titicaca* lies in its southern part, among the mountains. Its chief cities are *Lima*, the capital; and south-east of it *Cusco*, and *Arequipa;* but the principal seaports are *Callao* near Lima, and *Truxillo*. Peru produces the Peruvian bark, and various tropical fruits; and it is the native country of the llama, which is used as a beast of burthen. This country is rich in mines of gold and silver; and abounds in interesting antiquities. It has been divided into two states, *North Peru* and *South Peru;* but the government is at present in an unsettled state.

§ 3. The *Central Division* of South America, colonized also by the Spaniards, has a cooler climate than the preceding, but still abounds in tropical productions. Its state in regard to religion, government and civilization, is quite similar to that of the preceding division.

Bolivia, sometimes called Upper Peru, contains *Mount Sorata*, said to be the highest peak of the Andes, or nearly four miles and three-fifths, in height. The *Madeira* river runs from it northward to the Amazon; and the *Pilcomayo* and *Vermejo* run south-eastward into the Paraguay. Its chief cities are *Chuquisaca*, the capital; and north of it *Cochabamba*, and *La Paz*. It raises grain for exportation to Peru, and contains the rich silver mines of Potosi; but here as in the contiguous countries, the arts are in a backward state. *Chili* lies south of Peru, or the Desert of *Atacama;* and between the Pacific ocean and the Andes. The islands of *Chiloe*, on the south, and *Juan Fernandez*, on the west, belong to Chili. Its chief towns are *Santiago*, the capital, in the interior; and *Valparaiso*, near it, on the coast. The climate is temperate, and Chili produces various grains, with cotton, sugar, oil, and wine. It has some mines of the precious metals; and is more advanced in the arts than the preceding states. The southern part is still inhabited by the *Araucanian* Indians; a brave and hardy race.

La Plata, or the *Argentine Republic*, called also *Buenos Ayres*, lies east of Chili, and is named from the river *La Plata*, which runs through its eastern part. It contains also the *Salado*, which is a branch of the La Plata; and, in its southern part, the rivers *Colorado* and *Negro*. Its chief cities are *Buenos Ayres*, the capital, in the east; and *Cordova* and *San Juan*, more central. Among the animals of La Plata are the rhea, or American ostrich; and wild horses and cattle; which are hunted by horsemen, on its extensive *Pampas* or plains. *Paraguay*, north-east of La Plata, and formerly a part of it, lies between the rivers *Paraguay* and *Parana*. *Assumption* is its capital, and though small, its largest city. Most of its inhabitants are Indians. Its government is an absolute monarchy, under a self-constituted *Dictator;* and its religion is the Roman Catholic. *Uruguay*, or *Monte Video*, formerly called the *Banda Oriental*, lies east of La Plata, and borders on the river *Uruguay*, from which it is named. *Montevideo* is its capital and chief city. In productions and characteristics, it resembles La Plata, of which it was formerly a part.

§ 4. *Patagonia*, the southern division of South America, is a cold and rather barren region, sparsely inhabited by Indians, of whom the *Puelches*, in the north, and *Moluches*, in the south, are said to be the principal tribes. The islands of *Terra del Fuego* are included with Patagonia; but the *Falkland* Islands on the east are claimed by Buenos Ayres, and by Great Britain. The islands of *South Shetland*, *South Orkney*, and *Sandwich Land*, farther south, discovered since 1819, are chiefly visited for the purpose of procuring the skins of the seals in which they abound.

CHAPTER VI.

OCEANIC GEOGRAPHY.

The name *Oceanica*, was introduced by Malte-Brun, to comprehend New Holland, and the numerous islands of the Pacific Ocean, which together form the sixth grand division of the earth. It is usually subdivided into Malaysia, including the islands north-west of New Holland and New Guinea; Australasia, including these two islands, and the range eastward of them; and Polynesia; including the numerous other groups farther eastward and northward; excepting those on the immediate coast of America, or Asia. Most of these islands are inhabited by savage tribes, imperfectly known. Java, and Sumatra, were discovered by the Portuguese, in 1510; Celebes, in 1512; and Borneo, they visited in 1526. The discovery of New Holland, has been attributed to *Gonneville*, in 1503; and more probably to *Menezis*, a Portuguese, in 1527; but if so, it was rediscovered by *Quiros*, a Spaniard, in 1606, or by *Dirk Hartag*, or Hartigh, a Dutchman, in 1616. Van Diemen's Land, and New Zealand, were discovered by *Tasman*, in 1642. Lemaire and Schouten were also sent out by the Dutch government; but their discoveries were of minor importance.

Most of the other discoveries in Oceanica, have been made by circumnavigators, while on their *Voyages around the World*; of which this seems the proper place to speak. The first of these voyages was that of *Fernando Magellan*, (or Magalhaens), who sailed from Spain, in 1519; discovered the straits bearing his name, in 1520; and, passing through them, into the Pacific ocean, discovered the Ladrones, and Philippine Islands, in 1521. He was killed on one of the latter islands, in the same year; but one of his ships, after discovering Borneo, returned to Spain, in 1522. Next to this, we would mention the voyage of *Saavedra*, though it was only across the Pacific Ocean. He sailed from Mexico around South America, in 1527; and is said to have discovered New Guinea, and Gilolo, in 1528. The second voyage around the world, was that of *Sir Francis Drake*, who sailed from England, in 1577; discovered Cape Horn, and visited California, in 1578; and returned to England, in 1580. The third circumnavigator, was *Sir Thomas Cavendish*, in 1586–8; and the fourth, was *Oliver Van Noort*, who performed the first Dutch circumnavigation, in 1598–1601. *Mendana* discovered the Solomon isles, in 1595; and *Quiros* discovered the Marquesas, in the same year. Quiros also discovered the New Hebrides, in 1606; and named them Tierra Australia del Espiritu Santo; but Bougainville called them the Great Cyclades; and Capt. Cook gave them their present name, in 1774. The Caroline Isles, were discovered by the Spaniards, in 1686.

Among other voyages around the world, are those of *Dampier*, who sailed in 1683, and visited Juan Fernandez; of *Anson*, in 1740, chiefly for warlike purposes; of *Byron*, in 1764, who discovered King George's, Prince of Wales', and other islands; that of *Bougainville*, who visited the New Hebrides, in 1768; and of *Capt. Cook*, who made three voyages around the world, beginning in 1768, on the third of which he was killed at Owyhee, in 1779. He discovered the Society Islands, in 1769, the Friendly Islands, in 1773, and the Sandwich Islands, in 1778; and first surveyed the eastern coast of New Holland, in 1770. *Furneaux*, in 1773, completed the exploration of the coast of New Holland, by connecting Tasman's discoveries, with those of Cook. The unhappy voyage of Lapérouse; both of whose vessels were lost, in 1788; and the later voyages around the world, by Krusenstern, Kotzebue, and others, we have no room here to describe.

The following table gives the extent and population of Oceanica, as nearly as we can ascertain them.

Islands.	*Sq. Miles.*	*Inhabitants.*
Sunda Islands	245,000	10,000,000
Celebes and Moluccas	90,000	2,000,000
Borneo	360,000	3,000,000
Philippine Islands	105,000	2,300,000
Australia and Tasmania	3,000,000	2,000,000
New Zealand	90,000	300,000
New Guinea, or Papua	275,000	500,000
New British Range	70,000	300,000
West Polynesia	25,000	150,000
Central Polynesia,	40,000	300,000
East Polynesia	65,000	250,000
Total	4,365,000	21,100,000

We proceed to treat of these islands, in the order above named.

§ 1. The name *Malaysia*, is applied to the group of the Sunda Islands, Celebes, and the Moluccas, Borneo, and the Philippine Islands; from their being inhabited chiefly by the Malay race, and lying near Asia. They are sometimes called the Indian Archipelago; being regarded as a part of the East Indies. They abound in the richest tropical productions; and have an extensive commerce; but the inhabitants are generally pagans, living in tribes, and in a half civilized or barbarous state.

The *Sunda Islands*, include *Sumatra*, and, south-east of it, *Java*, and *Sumbawa;* to which we would add *Floris*, and *Timor*, more eastward, in the same range. These islands contain several volcanoes, some of which are almost continually in action. Their chief cities, are, in Sumatra, *Palembang;* and in Java, *Batavia*, the Dutch capital, and *Samarang*. The small island of *Banca*, east of Sumatra, has valuable mines of tin, wrought by the Chinese. These islands, however, belong principally to the Dutch; and trade in rice, sugar, coffee, pepper, and other tropical productions. The *Moluccas*, or *Spice Islands*, are the small islands east of *Celebes*, which island we would include in the same group, from its contiguity, and the similarity of its productions. *Gilolo*, *Bouro*, and *Ceram*, are the largest of the Spice Islands; and the smaller islands west of Gilolo, are the only places where the clove tree is indigenous. These islands belong mostly to the Dutch; who possess the town of *Macassar*, on the Island of Celebes.

Borneo, is, next to Australia, the largest island in the world; and like the preceding islands, belongs chiefly to the Dutch. Its capital is the town of *Borneo*, in the northern part. The inhabitants are partly savage native tribes, and partly Malays, professing the Mohamedan religion. Borneo is the home of the ourang-outang, and is rich in gold and diamonds. The *Philippine Islands*, more than 1000 in number, belong to the Spaniards. The largest islands, are *Luzon*, or Luconia; and *Mindanao*, or Magindanao; next to which, in size, are *Palawan*, and *Samar*. The chief city and capital, is *Manilla*, on the island of Luzon.

§ 2. *Australasia* comprehends Australia, Tasmania, New Zealand, New Guinea, and what may be termed the New British Range, or the Solomon Islands and New Hebrides. The inhabitants of these islands, excepting New Zealand, are chiefly a peculiar black race, called *Papuan Negroes*, in a very savage state.

Australia was formerly called *New Holland;* but the latter name is now restricted to the western part of this wide region; the eastern being called *New South Wales.* The British have colonized the south-eastern portion, called *Botany Bay;* and still send criminals thither as temporary slaves. *Sidney* is its capital and chief town. *Tasmania*, or *Van Diemen's Land*, an island south of Australia, is also colonized by the British; *Hobart Town* being its capital; and more recently a colony has been established in the south-western part of Australia, on the Swan River. *New Zealand*, comprises two large islands, *Eahei* and *Tavai*, south-east of Australia, inhabited by native tribes of the Malay race, of a very ferocious character. These islands have also been colonized by the British; and there is here a confederation of native chiefs, under British protection. The Bay of Islands, in Eahei, the more northern island of this group, is a favorite resort for whale ships.

New Guinea or *Papua*, north of Australia, is said to be a fertile island, of which little is known. We would designate as the *New British Range*, the islands of Louisiade, New Britain, New Ireland, New Georgia, and the other *Solomon Islands* east of Papua; and the *New Hebrides*, and *New Caledonia*, farther south; all of which islands are very imperfectly known. Their names, it will be observed, mostly commence with the word *new*, and several of them allude to the British Islands; which analogy has suggested the appellation above proposed.

§ 3. The name of *Polynesia*, is applied to the numerous islands of the Pacific, east of the preceding divisions, inhabited chiefly by native tribes of the Indian or Malay races, and abounding in tropical productions.

We would apply the name *Western Polynesia* to the *Caroline Islands;* the *Ladrones*, north of them; *Magellan's Archipelago*, still farther north; and *Anson's Archipelago*, east of Magellan's. The first two of these groups are subject to the Spaniards; who have treated the natives with great cruelty. In *Central Polynesia*, we would comprehend the *Central Archipelago*, including Mulgrave's, Gilbert's, Taswell's, Byron's, and other islands; together with the *Friendly Islands*, and the neighboring groups, the Navigator's, on the north-east, the Feejee, on the west, and the Tonga islands, on the south, which together might be termed the *Friendly Archipelago*. Many of the Friendly islanders are already converted to Christianity.

Finally, in *Eastern Polynesia*, we would comprehend the *Sandwich Islands;* Christmas Island and the contiguous group; *Mendana's Archipelago*, including the Marquesas and Washington islands; and the *Society Archipelago*, including the Society Islands; King George's and Prince of Wales' Islands, north-east of them; Palliser and Pearl Islands, on the east; Gambier Islands, and Pitcairn's Island, farther south and east; Austral Islands, on the south; and Cook's or Hervey's Islands, on the south-west. The Sandwich islands, including *Owyhee*, and the Society islands, including *Otaheite*, have been recently converted to Christianity, by the labors of protestant missionaries: but a wide field of labor yet remains, in this part of the globe, for the friends of religion and humanity.

VI. DEPARTMENT:

CHRONOGRAPHY.

In the department of Chronography, we include the Civil or Political History of all nations, from the most ancient times; and their Archæology, or the study of their antiquities, so far as this subject is properly treated in connection with history, or in an historical manner. The name is derived from the Greek, χρονος, time; and γραφη, a description; literally signifying a description of times, or events. We prefer this name for the present department, both from its symmetry, and because the term History, from the Greek, ἱστορια, originally signified, and was used by Lord Bacon to include, all knowledge of facts, depending on memory or records. Hence the term Natural History was applied to the study of animated and inanimate nature; which has but slight relations to the studies here embraced. Or, if History be restricted to a narration of past events, every branch of knowledge has its own history; and the term would still be too comprehensive for the present department of Human Knowledge.

By *Civil* or *Political History*, is meant the study or record of such past events, as had a national character or influence; with philosophical views of their causes and consequences. *Sacred History*, is that which is contained in the Bible; all other being called Profane, or more properly *Secular History*. Of Ecclesiastical History, or that of the Christian Church, we have already spoken, as far as our present limits would allow. (p. 145). *Particular History*, is confined to some one state or division of the earth; or to some limited period; but *General* or Universal History, treats of all nations, in all ages, with due reference to their connections and relations. General History is usually subdivided into *Chronological Periods*, more or less numerous; but most frequently into *Ancient*, *Mediæval* or Middle, and *Modern History:* the first extending to the fall of the Roman Empire in Italy, A. D. 476; the second to the discovery of America, in 1492; and the third, to the present time. Most works on General History are arranged in *Chronological order;* giving the History of several nations in connection, at least for brief periods: but we shall here adopt the *Ethnographical order;* and trace the History of each nation from its origin to its downfall; except in making a distinct branch of Ancient History, in conformity to general usage.

Of the uses of History, as a discipline of memory, and reason; as auxiliary to the studies of Government and Religion; as a magazine of valuable information; and as a fruitful source of practical philosophy, we have no room farther to speak; but would add, that even as an object of amusement, History may vie with poetry and romance; since facts are often more wonderful, than the fictions which they suggest. But in order to develope its full utility, Civil History should contain something more than a record of wars and battles, the intrigues of courts, and the crimes or exploits of princes and heroes. It should imbody the form and spirit of each succeeding age; portraying its moral and social features, in the walks of common life; and exhibiting its progress in those arts and sciences which have so much improved the condition of the human race. This study cannot be fully appreciated, and enjoyed, without an adequate knowledge of Geography; nor unless accompanied by the study of Chronology and Antiquities; by the aid of which the reader is transported in imagination to the very time and place of the scenes or events described.

The progress of Historical knowledge, has naturally been coextensive with that of the means of recording and transmitting information. Next to the books of *Moses*, and the Egyptian Hieroglyphics, the oldest historical work, of which some fragments are still preserved, is that attributed to *Sanchoniathon*, of Phœnicia, who is supposed to have lived some time before the Trojan war. For a long period after this date, the chief sources of History, were poetical or oral traditions; monuments and brief inscriptions; and festivals or ceremonies, in commemoration of great events. The poems of Homer, are an example of the first class; the chronicle of Paros, or Arundelian marbles, of the second; and the Grecian games, may be cited as an example of the third. *Pherecydes*, of Leros, and the three Milesians, *Dionysius*, *Cadmus*, and *Hecatæus*, all of whom lived between 550 and 500 B. C., are mentioned as the earliest writers of History in prose; but their works are mostly lost. From this period History began to assume a more accurate form, in the hands of the classic writers, who will be mentioned in their due place.

Archæology, is that branch of knowledge which treats of *antiquities*, or the memorials and relics of ancient times. The name is radically derived from the Greek αρχαιος, ancient; corresponding to the Latin *antiquus*, of the same signification. Antiquities were termed, by Lord Bacon, "the wrecks of history;" and certainly they are so interwoven with it, that their study may to a certain extent be regarded as a part of it, and comprehended in the same department of knowledge. Archæology relates not only to the remains of ancient art, such as buildings, monuments, statues, coins, inscriptions, books, manuscripts, vessels, weapons, and utensils; but also to the manners and customs, politics and religion, sciences and arts, of past ages. Thus, each country has its own antiquities; which serve to illustrate and enliven its history. Each of the arts has also its own antiquities, to which we shall refer in their place. Antiquities have been subdivided into theological, political, literary; technical, domestic, and military; but we think that those of each nation, and especially those of each department of knowledge, merit a separate consideration. Instead, therefore, of devoting a distinct chapter to antiquities, we shall, in this work, distribute them, on the principle just explained.

Numismatics, or Numismatology, is that portion of Archæology which relates to *coins* and *medals*, with their devices, dates and inscriptions; which often serve to verify facts of History, Chronology, or Biography. *Coins*, are usually pieces of metal, stamped by public authority, and designed to circulate as a medium of exchange. *Medals*, are pieces stamped in honor of some person, or in commemoration of some event, but not designed to circulate as money. Coins are usually made of gold, silver, copper, or brass; but wooden money is mentioned among the Romans; iron was coined by the Spartans; and shells are still used as money by various savage tribes. The number of different ancient coins and medals, is estimated, by Millin, at 70,000. The earliest extant, having the stamp of any individual, are those of Alexander I., of Macedon, about 500 B. C.; but there are coins of particular cities or towns, still more ancient.* The term *Epigraphics*, has been applied to the study of *inscriptions*, whether on coins, gems, monuments, buildings, or elsewhere; which study is merely a subdivision of Archæology. *Sphragistics*, or the study of seals, and *Autographics*, or that of signatures, belong more properly to the next department, that of Biography.

Chronology, is that division of Historical science, which treats of the *dates* of events, and the modes of ascertaining them. The name is from the Greek χρονος, time; and it is sometimes subdivided into *Mathematical* Chronology, or the ascertainment and comparison of epochs and eras; *Astronomical*, or the fixing of particular dates, by their relation to celestial phenomena; and *Historical*, or the fixing of dates by inscriptions, and other means. An *era*, is a point of time fixed upon by some nation or body of men, from which to reckon dates; and an *epoch*, is a like point of time agreed upon by historians and chronologists. The Greeks reckoned time by *Olympiads*, or periods of four years each; commencing 776 years before the Christian Era: this being the date of the triumph of Choræbus, at the Olympic games; which were celebrated once in four years. The Romans reckoned time from the *founding of Rome*, 753 years before the Christian Era, or 754 B. C. Dates reckoned from this era, are designated by the initials A. U. C., signifying *ab urbe condita*, that is, from the building of the city. The era of *Nabonassar*, 747 B. C., and that of the *Seleucidæ*, 312 B. C., were somewhat used in the east. The Mohamedans reckon time from the *Hegira*, or flight of Mohamed from Mecca to Medina, A. D. 622: but they use the *lunar year* of 354 days; making a difference of one year in 33 of ours. The Persian era of *Yezdegird* III., commenced 10 years later, or A. D. 632.

The *Christian Era*, now in use among all Christian nations, was introduced by Dionysius the Little, a Scythian Monk, A. D. 526. Following the statement of St. Luke, that John the Baptist commenced preaching in the fifteenth year of the reign of Tiberius, and reckoning this reign from the death of Augustus, A. U. C. 767,

* The value of some of the principal modern coins, will be stated under the branch of Commerce.

Dionysius supposed John's preaching to have commenced A. U. C. 783; and as Jesus, when baptized, in the following year, was about thirty years of age, his birth was supposed to have taken place, A. U. C. 754, which is the common or vulgar Christian Era. But this disagrees with the well ascertained fact that Herod, the infanticide, died A. U. C. 750; and that our Saviour was born a year or two before his death. Hence it is now generally agreed that the Nativity, or birth of our Saviour, took place four years before the Christian Era, or in the year 4 B. C.; and that St. Luke reckoned the reign of Tiberius as commencing A. U. C. 764, when he was admitted to share the imperial dignity with Augustus. This reconciles the difference, without doing violence to either Sacred history, or secular. Dates reckoned backward from the Christian Era, are usually marked *B. C.* or before Christ; but those reckoned forward, are usually distinguished by the prefix *A. D.*, signifying *Anno Domini*, or in the year of our Lord. The initials A. C., sometimes used for *after Christ*, are ambiguous; as they may also stand for *ante Christum*, that is *before Christ.*

The Jews profess to reckon time from the *creation* of the world: which they date 3760 B. C. But this date rests solely on the authority of the Bible; of which the Hebrew, Samaritan, and Septuagint versions materially differ on this point. Archbishop Usher, following the Hebrew text, dates the Creation 4004 B. C., and the Deluge 2348 B. C.; which are the dates usually given. But Dr. Hales believes that the Jews falsified their chronology, to prevent the application of their traditions to our Saviour; and, on the authority of Josephus, he dates the Creation 5411 B. C.; and the Deluge 3155 B. C.: this latter date agreeing very nearly with that of the *Kali-Yug*, (Cali-Yug), or last deluge of the Hindoos, which they date 3102 B. C. Müller, following more closely the Septuagint, dates the Creation 5722 B. C.; but we incline to the opinion that the truth lies between the Chronology of Hales and that of Usher.

It may be here remarked that the modern discoveries in Geology by no means disprove either of these dates, as the period when *man* was created; though the earth itself is doubtless much older. Some learned men believe that the *six days of creation* were so many long periods of the earth's progressive changes, before the creation of mankind: an opinion which we think highly probable. The ancient oriental writers also used the word which we translate *year*, to signify a *day*, or a *lunar month*, or a *half year*. Thus Epigenes states that astronomical observations were made at Babylon, 720,000 years before its conquest by Alexander; but calling these so many days, they make the time nearly as stated by Callisthenes, or about 1900 years. In like manner the Egyptian period of 30,000 years, called the *reign of the sun*, may be reduced to the 82 years of Joseph's administration, according to the Scripture.

Time is naturally divided into days, months, and years; but its division into *weeks*, is arbitrary, and must be traced back to a divine ordinance. Our names of the *days* are derived from the mythology of our Saxon ancestors; Sunday, from *the Sun;* Monday, from *the Moon;* Tuesday, from *Tuisco*, an ancient hero; Wednesday, from

Woden, their god of battle: Thursday, from *Thor*, god of winds and weather; Friday, from *Friga*, goddess of peace and plenty; and Saturday, from *Seator*, their god of freedom. The term *month*, was originally applied to the time from one new or full moon, to the next. The *lunar month*, thus defined, has an average length of 29 days, 12 hours, 44 minutes, and 3 seconds; but the *calendar months* vary in length, as shown by the *Almanac*. The names of the calendar months, are derived from the Latin; as follows: January, from *Janus*, the god who rules the year; February, from *Februa*, the goddess of purification; March, from *Mars*, the god of war; April, from *Aphrodite*, the goddess of love, (or from *aperire*, to open or blossom); May, from *Maia*, the mother of Mercury; June, from *Juno*, the queen of heaven; July, from *Julius Cæsar*; August, from *Augustus*; September from *septem*, seven; October, from *octo*, eight; November, from *novem*, nine; and December, from *decem*, ten; these latter being the seventh, eighth, ninth, and tenth months of the old Roman year; which previous to the time of Numa, consisted of only ten months, beginning with March.

The year is naturally regulated by the seasons, as these are, by the return of the sun to the tropics or equator. The *solar*, *tropical* or *equinoctial year*, thus defined, contains 365 days, 5 hours, 48 minutes, and 48 seconds; though the ordinary civil year consists of 365 days. The *Julian Calendar*, so called because reformed by Julius Cæsar, with the aid of Sosigenes of Alexandria, allowed one additional day in every fourth year, which hence was called *Bissextile* or *Leap year*, making the average length of the year 365 days and 6 hours. The error thus committed of making the year 11 minutes and 11 seconds too long, was rectified under Pope Gregory XIII., in 1582; by dropping ten days from the month of October in that year, and omitting one day in every 400 years thereafter. The Calendar thus reformed, is hence called the *Gregorian Calendar*; the same which we now use. It was not introduced into England until 1752; when, by an act of Parliament, 11 days were dropped from that year, by calling the third of September, the fourteenth. This change constitutes the difference between *Old* and *New Style*.

The *Solar Cycle*, is a period of 28 years, at the end of which, according to the Julian Calendar, the days of the week return to the same days of the month on which they were at its commencement. The *Lunar Cycle*, invented by Meton, and hence sometimes called the *Metonic Cycle*, is a period of 19 years; at the end of which the new and full moon return on the same days of the year as at its beginning; at least for a long period. As the Grecian festivals were regulated by this cycle, the current year of it was incribed on a marble pillar, in letters of gold; and hence called the *golden number*. The *Cycle of the Indiction*, was a period of fifteen years, arbitrarily established by the Roman emperors, in reference to certain judicial acts. And the *Julian Period*, designed to fix an epoch from which to reckon time, was formed by multiplying together the numbers for the three preceding cycles, 28, 19, and 15; making a product of 7980 years; which were made to commence 4714 B. C., or nearly at the Samaritan date of the Creation.

We proceed to treat of Civil History and Antiquities, under the branches of Euclassic, Oriental, European, and American Chronography; extending the term Oriental to the History of the Mohamedan parts of Africa; the only parts whose history is much known; and restricting the term European, to the History of Europe in the middle ages, and in modern times.

CHAPTER I.

EUCLASSIC CHRONOGRAPHY.

In the branch of Euclassic Chronography, we would treat of the History and Antiquities of those nations which were known to the ancient Greeks and Romans. It comprehends therefore the greater part of Ancient History; excluding only that of India and China, which have so little connection with the rest, that they are reserved for the branch of Oriental Chronography. The name *classic*, is derived from the Latin, *classis*, a form, or bench in a school: and it was applied to those studies which were taught in the schools of Rome, in the Greek and Latin languages. But as it is now extended to the best writings in the modern languages, we have here adopted the term Euclassic; adding the Greek *ευ*, an emphatic prefix, to distinguish the ancient classics from the modern.

Ancient History, commences of course, with the Creation of the World; according to Hales, 5411 B. C.; but according to Usher, 4004. Of this, and of the succeeding events, down to the founding of the ancient empires, our only record is that found in the Bible; the first books of which we may consider as introductory to *Secular History*. The book of *Genesis*, written by *Moses*, according to Hales, about 1610, or as usually stated, about 1452 B. C., (p. 141), is referred to as authentic, by the earliest writers who had access to it, both sacred and secular. Its statements concerning the Creation, and the Deluge, are consistent with, and even corroborated by, the discoveries of modern Geology; as we shall endeavor to explain, when treating of that science. The *Noachian Deluge*, or Noah's Flood, took place, according to Hales, 3155 B. C.; but according to Usher, 2348; when the race of men, grown impious through longevity and luxury, were all destroyed, except *Noah* and his family, by whom the earth was repeopled. It is believed that the Jews and eastern Asiatics, and probably the American Indians, are descended from *Shem;* the Canaanites and Africans from *Ham;* and the Europeans, with the north-western Asiatics, from *Japhet*. The building of the *Tower of Babel*, interrupted, according to Hales, 2614; but according to Usher, 2247 B. C., probably gave rise to the fable of the wars of the giants against the gods: and the ruins of that tower are believed still to exist, in the *Birs Nimrood*, a vast heap or pile, on the supposed site of ancient Babylon.

From this period we may commence the *History of Nations:* as the earliest empires originated then, or soon after; and possibly even before the last named event. Greece and Rome emerged from barbarism, at a much later period; but to them more than to any other nations, belongs the proud boast of having attained to universal empire. We shall here treat first of Jewish history, on account of its authenticity and sacred character; and next take that of its neighbors, Egypt and Babylon. The history of Persia will follow that of Babylon; and lead to those of Greece and Rome. The minor nations will be referred to in connection with those here named; and we shall, in this chapter, continue the history of Rome to the downfall of the Western Empire, A. D. 476; and that of Greece to the fall of the Byzantine or Greek empire, A. D. 1453.

§ 1. The *History of the Jews*, a nation professedly devoted to the worship of the true God, while the surrounding nations were merged in idolatry, and who still, after their dispersion and persecutions, remain a distinct people, is perhaps the most remarkable which the world has ever witnessed. Of their ancestry and early history, down to the *Conquest of Canaan*, by *Joshua*, 1446, or according to Hales, 1602, B. C., we have already spoken, under the History of Judaism. (p. 140). From this period, the Jews, governed by the Divine Law, had no other temporal rulers than the *Judges*, so called, or leaders in their wars against the surrounding tribes; until, at their urgent desire, *Saul* was anointed king of Israel, 1095, (or 1110), B. C. He was succeeded by *David*, the shepherd king and psalmist; whose son *Solomon* built the splendid Temple at Jerusalem, and dedicated it to the one true God, 1004, (or 1020), B. C.

In the reign of *Rehoboam*, the son of Solomon, ten of the tribes revolted, and selected *Jeroboam* as their king, 975, (or 990), B. C.; thus establishing the kingdom of *Israel*, with Samaria for its capital; in opposition to the two tribes under Rehoboam, or the kingdom of *Judah*. Jerusalem was soon after plundered by Shishak, king of Egypt, about 980, B. C.; and Samaria was besieged, but in vain, by Benhadad, king of Syria, 892, (or 900), B. C. After these events, both kingdoms, on account of their disobedience and idolatry, were abandoned by the divine favor. Pul, king of Assyria, tributized *Menahem*, king of Israel, 770 B. C.; and the Assyrian Shalmaneser conquered Israel, carried away the ten Tribes, and dispersed them in central Asia, 720 B. C.; since which event, their fate is unknown. The kingdom of Judah was assailed in vain by Sennacherib, in the reign of the good *Hezekiah*, 713, (or 715), B. C.; but Esarhaddon rendered it tributary, and carried its king, *Manasseh*, a captive to Babylon, 676 B. C. Nebuchadnezzar, at length carried all the remaining Jews into *Babylonian Captivity*, 588, (or 586), B. C., destroying Jerusalem, and Solomon's Temple. The captives were at length partially restored, by the favor of Cyrus, the Persian conqueror; and permitted to rebuild the temple, which was dedicated 515 B. C. With the succeeding administration of *Ezra* and *Nehemiah*, the Old Testament history closes, about 420 B. C.

Judea continued to be a Persian province, till the triumphs of Alexander the Great; who visited Jerusalem courteously, 332 B. C. After his death, Judea was connected with Egypt, under the Ptolemies, till it revolted and submitted to Antiochus the Great, of Syria, about 200 B. C. Under the *Maccabees*, sons of the priest Matthias, it became independent about 163 B. C., and so continued till it was subdued by the Romans, 63 B. C., under Pompey the Great. After the persecution and crucifixion of our Saviour, and in the midst of civil dissension and bloodshed, Jerusalem was taken and utterly destroyed by the Romans, under Titus, A. D. 70. During the siege, 1,100,000 Jews perished, and the rest were subdued or dispersed; so that after some struggles for independence, down to A. D. 135, they ceased to have any longer a national existence.

§ 2. The *Ancient History of Egypt*, like that of all the remaining ancient nations, is involved in obscurity and uncertainty. The fragments of it, preserved by Herodotus, Manetho, and others, often disagree with each other and with the monumental inscriptions; though they are still deserving of some consideration. The results deduced from all these sources by Champollion, Rossellini, Wilkinson, and Hales, are those on which we would mostly rely. Egypt was probably first settled by *Mizraim*, the son of Ham, who built No-Ammon, or *Thebes*, according to Hales, 2600 B. C.; though others suppose him to be the same as *Menes*, (Menai or Minæus), who built *Memphis*, about 2400, (or according to Usher, 2188), B. C. *Tanis*, (Zan or Zoan), in the Delta, is supposed to have been built 2146 B. C. The earliest period of Egyptian History, including the times of Busiris, Suphis, Phiops or Apappus, and Nitocris, down to the 18th dynasty of Manetho, is utterly confused and uncertain. It includes the invasion and rule of the *Hyc-sos*, or Shepherd Kings, who probably reigned in the time of Abraham, but were expelled before the time of Joseph: though some suppose these shepherds to have been the Israelites themselves.

Among the oldest monuments of Egypt, are the *Pyramids*, near Memphis, begun, according to Manetho and Wilkinson, by *Suphis*, (or Saophis), about 2100 B. C. Herodotus attributes them to Cheops, Cephren, and Mycerinus, about 1000 B. C.; but it seems more probable that they merely received names from these kings, and were built at an earlier period. Commencing with Manetho's 18th dynasty, 1822, or according to Wilkinson, 1575 B. C., we have a consistent series of reigns, down to the Persian and Grecian conquests: and on this series we would place some reliance. It was probably near the beginning or middle of the 18th dynasty, that the Israelites departed from Egypt: and among its kings, were Thoutmosis, or Miphres, probably the *Moeris* of Herodotus; Amenophis, probably the *Memnon* of the vocal statue; and Ramses Meiamoun, probably the renowned *Osymandias;* or, as some suppose, the Sesostris of the Greeks, whose conquests extended to India; though it seems more probable that Sesostris was the *Sethos* of Manetho's next dynasty, about 1400 B. C.

From this period, in which many of the temples and tombs appear to have been built, little occurs of interest till the age of the Trojan war; when Thuoris, or, according to others, Proteus or Cetes, ruled in Egypt, 1184 B. C. Here a chasm of 150 years occurs in Manetho's list, which we think may be filled by the names of Proteus. *Cheops*, and others of Herodotus, down to about 1100 B. C. Shishak, who invaded Judea, was doubtless the *Sesonchis* of Manetho. Egypt was afterwards conquered by the Ethiopians or Cushites, and divided into 12 nomes or provinces, till it was again united under *Psammetichus*, about 664 B. C. *Necho* II. began the Canal from the Red sea to the Nile, about 610 B. C.; but was defeated by Nebuchadnezzar; and *Psammenitus*, was subjugated by *Cambyses*, of Persia, 525 B. C. Egypt recovered its freedom again, under *Amyrteus* of Sais, about 414 B. C.; but was reconquered by the Persian *Ochus*, (Artaxerxes III.), and fell with Persia under the power of *Alexander* the Great, 332 B. C. After his death it was ruled by the *Ptolemies*, till the battle of Actium, and death of *Cleopatra*, 31 B. C.; when Egypt became a Roman province.

§ 3. The *History of Assyria*, and of the adjacent regions, including Babylon, is also very confused and uncertain, down to the times of the Jewish monarchy. It commences with the founding of *Babylon*, by Nimrod; according to Hales 2547, but, as usually stated, 2234 B. C. Nimrod is supposed to have been the *Belus* of the Greek historians; the name Bel, or Baal, in Chaldee, signifying lord, or ruler. The city of *Nineveh* was built soon after Babylon; but whether by Ashur, who was the son of Shem, and gave name to *Assyria*, or by Nimrod himself, is uncertain; for translators differ concerning the meaning of the original Scripture, on this point. It seems that Nineveh and Babylon were both united, under the sway of Nimrod, forming what is called the first *Assyrian Empire*. Callisthenes states that Alexander the Great found, in Babylon, a record of astronomical observations, extending back to 2234 B. C.; from which it is probable that the city was built at an earlier date.

The subsequent reigns of Ninus, Queen *Semiramis*, and Ninias, are involved in fable; nor is it certain whether they immediately succeeded Nimrod, or lived at a much later period. A long chasm occurs in this history, filled only by the names of kings recorded by Ctesias, and by the invasion of *Sesostris*, till the time of the effeminate *Sardanapalus;* when *Arbaces*, governor of Media, and *Belesis*, governor of Babylon, revolted, and founded the kingdoms of Media and Babylon, about 820 B. C. The latter of these is known as the *second Assyrian empire:* but after the reign of *Pul*, Babylon and Nineveh were again separated, 747 B. C.; the former under *Nabonassar*, and the latter under *Tiglath-Pileser*. The successors of the latter, at Nineveh, were Shalmaneser; *Sennacherib;* Esarhaddon, who regained Babylon about 680 B. C.; Saosduchinus; Nabuchodonosor; Chiniladon; and Sarac or Sardanapalus II.; in whose reign *Nabopolassar*, of Babylon, forming a league with Cyaxares, king of Media, made himself master of Assyria, 612 B. C. Thus ended the second Assyrian, and commenced the *Babylonian Empire*, distinctively so called. The next king was Nabuchadonosor II., or *Nebuchadnezzar*, who destroyed Jerusalem: and this dynasty closed with *Belshazzar;* when Babylon was taken by *Cyrus*, the Persian, 538 B. C.

On the death of his uncle, Cyaxares II., (called in Scripture Darius the Mede), Cyrus united Media and Babylon with Persia, and thus founded the great *Persian* (or Medo-Persian) empire, 536 B. C.* The immediate successors of Cyrus were *Cambyses*, who conquered Egypt; *Darius Hystaspes*, who invaded Scythia, India, and Greece, but was defeated at Marathon, 490 B. C.; and *Xerxes* I., or the Great, who also invaded Greece, but was checked at Thermopylæ, 480 B. C., and his forces defeated at Salamis, Platæa, and Mycale. The reign of *Artaxerxes* II., was marked by the ineffectual revolt of his brother Cyrus, and the retreat of the *ten thousand* Greeks, sent to assist him, 401 B. C. The last of these kings, *Darius Codomanus*, was defeated by Alexander the Great, at Issus and Arbela, and was slain 330 B. C.; when Persia became a part of the *Grecian empire*. After the death of Alexander, Persia, with Syria, fell to the lot of *Seleucus*, who commenced the dynasty of the Seleucidæ, 312 B. C. That dynasty lost possession of Persia, by the revolt of *Arsaces*, who founded the *Parthian empire*, or dynasty of the Arsacidæ, 250 B. C.: and this empire continued till A. D. 229; when *Ardshir* (Artaxerxes) obtained the sovereignty, and left it to his descendants, the Sassanides, including *Sapor*, the warrior, *Nourshivan* or Nousheerwan, the Just, *Chosroes* or Khoosroo, and others; with whom we close the ancient history of Assyria and Persia.

§ 4. Of the ancient history of *Western Asia*, and Carthage, we must speak very briefly. *Syria*, the ancient Aram, became a province of the Assyrian empire, about 750 B. C., and shared its fate, till after the death of Alexander the Great, when it fell to the lot of *Seleucus Nicator*, and became the seat of empire of the Seleucidæ, 312 B. C. The last king of this dynasty, *Antiochus Asiaticus*, was dethroned by Pompey, 65 B. C., when Syria became a Roman province. The land of *Canaan* was inhabited by small tribes, at a very early period: *Hebron* or Kirjath Arba having been built, according to Hales, about 2153 B. C.; and *Sodom* destroyed, 2054, or according to Usher, 1897 B. C. Among the tribes extirpated by the Jews, (p. 141), were the Ammonites, Moabites, Jebusites, Hivites, and Philistines. *Phœnicia* was very anciently a distinct state; *Tyre* having been built, according to Hales, 2267 B. C. The Tyrians were generally friendly to the Jews; but little is known of them, until the cruelty of their king, *Pygmalion*, caused his sister Dido to flee and found a new state, 878 B. C. Tyre was first taken by Nebuchadnezzar, 572 B. C., when *Ithobal* was its king; and finally by Alexander the Great, 332 B. C., who totally destroyed the city; after which Phœnicia became a part of Syria.

Carthage, was founded by *Dido*, with a Phœnician colony, 878 B. C. It gained possession of most of northern Africa; and then extended its conquests to Sicily. The Carthaginians, in league with Xerxes, were defeated by Gelon, king of Syracuse, at Himera, 480 B. C.; but from Hiero, the successor of Gelon, they took several cities. They were expelled from these, by the Romans, in the first

* Persia, under the *Kajanides*, had been a distinct kingdom, long before the time of Cyrus; and *Jemsheed* (Dschemschid or Giamschid) is said to have reigned there, and founded Istakhar or Persepolis, about 800 B. C. *Kaiumarath* is mentioned as the first king of Persia or Elam, according to Hales, 2190 B. C.

Punic war: but in return, their leader, *Hamilcar*, commenced the conquest of Spain, 237 B. C. This led to the second Punic war, and the fatal battle of Zama, lost by *Hannibal*, 202 B. C.; after which, Spain was ceded to the Romans. The third Punic war terminated in the final destruction of Carthage by the Romans, 146 B. C.

Among the kingdoms of *Asia Minor*, were Troy, Lydia, Caria, Phrygia, Bithynia, Cappadocia, and Pontus. *Troy*, was built by *Dardanus*, the grandson of Scamander, about 1480 B. C., and named from *Tros*, one of his successors; from another of whom, *Ilus*, it was also called *Ilion*. Little is known of its history, except the account which Homer gives of its destruction, after a ten years' siege, by the allied Greeks, 1184 B. C. *Priam* was its last king. *Lydia* became a distinct kingdom under the Atyadæ, about 1400 B. C. These were succeeded by the Heraclidæ, about the time of the Trojan war, ending with *Candaules*, 718 B. C.: and *Crœsus*, the last of the Mermnadæ, was conquered by Cyrus, 548 B. C.; when Lydia became a Persian province. Of *Caria*, we can only mention *Mausolus* and his queen Artemisia, 353 B. C., (some say 554); and of *Phrygia*, we would mention *Gorgius*, about 1370 B. C., and *Midas;* both belonging to the fabulous age. Asia Minor was successively conquered by the Persians under Cyrus; the Greeks, under Alexander: and the Romans, under Pompey and other generals. Mithridates VI., the last king of Pontus, long resisted the Roman power; but at length yielded his kingdom and his life, 66 B. C.

§ 5. The early *History of Greece*, is involved in fable and obscurity; but of the later times we have full accounts by Herodotus, Thucydides, Xenophon, and other historians. The first settlement in Greece, was probably *Sicyon;* which was founded by Ægialus, about 2089 B. C.; and which long remained a distinct kingdom. Inachus next founded the kingdom of *Argos*, 1856 B. C.; and from Pelasgus, one of his successors, the ancient Greeks are said to have received the name of *Pelasgians*.* *Ogyges* is mentioned as the most ancient ruler of Attica, about 1775 B. C.; in whose time a deluge is said to have occurred, which desolated that region, till the arrival of *Cecrops* from Egypt, who founded the city of *Athens*, 1556 B. C. *Sparta* was founded by Lelex, about 1516 B. C.; and the deluge of *Deucalion*, in Thessaly, is said to have happened in 1504; caused probably by an earthquake, like several others recorded by the Greeks. Amphictyon, of Athens, first united the Grecian states in the *Amphictyonic council*, 1497 B. C. *Cadmus*, the Phœnician, is said to have introduced letters into Greece, about 1490 B. C.; and Minos, king of *Crete*, celebrated for his wise laws, reigned about 1406. *Corinth*, though founded previously, became a distinct monarchy under Sisyphus, about 1380 B. C. The *Argonautic expedition*, by Jason, in the ship Argo, to Colchis, after the fabulous golden fleece, is usually dated 1263 B. C.

The *Trojan War*, in which Troy was taken and destroyed by the united Greeks, led by *Achilles*, 1184 B. C., was referred to in the preceding section. The wars of the *Heraclidæ*, or descendants of

* Perseus removed his capital from Argos to *Mycenæ*, about 1300 B. C.

Hercules, who became sovereigns of the Peloponnesian states, 1104 B. C.; and the self-sacrifice of *Codrus*, the last king of Athens, to secure his country the victory, 1070 B. C., we can only thus briefly mention. The Laws of *Lycurgus*, were promulgated in Sparta, 884 B. C.; and those of *Solon*, in Athens, 594 B. C.; the era of the Olympic games intervening. The *Wars with Persia*, commenced with the burning of Sardis, a Greek city, by Darius Hystaspes; whose forces were defeated by Miltiades, at *Marathon*, 490 B. C. The renewal of the war by Xerxes, and his invasion of Greece, led to the self-immolation of *Leonidas*, at *Thermopylæ*, 480 B. C.; the naval victory of Aristides and Themistocles, at *Salamis*, the same year; and the battles of *Platæa*, gained by Aristides and Pausanias, and *Mycale*, gained by Cimon, in the year following. The *Peloponnesian War*, between Athens and Sparta, began 431 B. C., and continued 27 years, when, after the death of *Pericles*, by the great Plague, Athens was completely humbled, and subjected to the *thirty tyrants*, appointed over it by *Lysander* of Sparta. The retreat of Xenophon, and the 10,000 Greeks, who were subsidized by Cyrus of Persia, took place 401 B. C.

The kingdom of *Macedonia*, was founded by *Caranus*, 814 B. C. Under *Philip*, it aspired to universal empire; and his designs were completed by *Alexander* the Great, his son and successor. Alexander became master of all Greece, 336 B. C.; gained his first victory over the Persians, at the river *Granicus*, two years after; and having extended his conquests from Egypt to India, died in Babylon, 323 B. C. He was succeeded in Macedonia by *Antipater*, and soon after by *Cassander;* but the Peloponnesian states resumed their independence, and formed the Achæan League, 284 B. C. Greece first became obnoxious to Rome, when *Pyrrhus*, king of Epirus, led an army to aid the Tarentines against the Romans, 280 B. C. Greece was invaded in its turn; *Philip* of Macedon was defeated by the Romans, at *Cynocephalæ*, 197 B. C., and subjugated by them at the battle of *Pydna*, 168 B. C. The *Achæan League*, was next defeated by Metellus, 147 B. C.; and in the following year, Mummius destroyed *Corinth;* when Greece became entirely subject to the Romans, 146 B. C.

§ 6. The *History of Rome*, naturally succeeds the more ancient history of Italy. The earliest settlers in Italy appear to have been the *Pelasgi*, probably from Asia, 1700 B. C.; and the *Sabines* and *Etrusci*, or Etrurians, next in antiquity, were perhaps of the same race. *Evander* is said to have led a colony from Arcadia to Italy, 1243 B. C.; and the Ausones, and Œnotri, probably migrated thither from Greece, after the escape of Æneas from Troy, and his arrival in Latium, 1182 B. C., as immortalized in the Æneid of Virgil. *Rome* is said to have been founded by *Romulus*, a reputed descendant of Æneas, 754 B. C.; it being at first a small castle on mount Palatine. The seizure of the *Sabine women*, involved Romulus in a war; which ended in a temporary alliance of most of the Sabines with the Romans, 750 B. C. *Numa Pompilius*, the second king, founded the religious system of the Romans; and *Tullus Hostilius* conquered the Albans, by the victory of the Horatii over the Curiatii, 667 B. C. *Ancus Martius* prevailed against the Latins and Sabines; and *Tarquinius Priscus*, successful in war, employed the spoils in improving the city. *Servius Tullius*, who began to reign 576 B. C., divided the people into thirty tribes, and enlarged the city; but *Tarquinius Superbus*, the seventh and last king, was expelled from Rome, with his family, on account of the outrage against Lucretia, by his son Sextus, 509 B. C.*

From this period, Rome was governed by *Consuls;* commencing with Junius Brutus and Collatinus; until it became an empire. The Tarquins engaged the Etruscans, under Porsenna, in a war with Rome; and also enlisted the Latins in their behalf: on which occasion, *Lartius* was made the first dictator, 498 B. C. The oppression of the plebeians by the nobles, and their withdrawal to Mt. Sacer, led to the appointment of *Tribunes* of the people, 493 B. C. The war with the Volsci, and banishment of *Coriolanus* soon followed; and in another war with the Volsci and Æqui, *Cincinnatus* was made dictator, 456 B. C. The laws of the *Twelve Tables*, were prepared by the *decemvirs*, who were deposed in consequence of the abuse of Virginia, by Appius Claudius, 450 B. C. Rome was first taken by the Gauls, under Brennus, 390 B. C.; but they were expelled by *Camillus*, as dictator; who also took Veii soon after. The Latins, long allied to the Romans, were at length subdued by them, 338 B. C., when the consul *Decius* fell; and the subjugation of the Tarentines and Samnites, made Rome the mistress of Italy, 272 B. C.

The first *Punic war*, commenced in Sicily, 264 B. C., and lasted 23 years; in which *Regulus* was taken prisoner by the Carthaginians; but the latter were expelled from Sicily. The second *Punic war*, began 218 B. C., and lasted 17 years: memorable for the victories of Hannibal over the Romans; till he was recalled, and defeated at *Zama*, by *Scipio Africanus.* Rome next carried its arms into the east; defeating Philip of Macedon, at Cynocephalæ, 197 B. C., and Antiochus the Great, at Magnesia, 190 B. C. The third *Punic war*, lasted only three years; at the end of which Carthage was totally destroyed by *Scipio Africanus the younger*, 146 B. C. In the same year the subjugation of Greece was completed, and Rome ruled from Spain to Thrace, inclusive.

The victories of *Marius* over the Teutones and Cimbri, occurred 101 B. C.; but the civil wars between him and Sylla, ended only in his death, and the dictatorship of *Sylla*, 86 B. C. A war with Mithridates, king of Pontus, resulted in the conquest of Asia Minor and Syria, by *Pompey*, 64 B. C.; the year before *Cataline's* conspiracy. The first *Triumvirate*, was formed by Crassus, Pompey, and Cæsar, 60 B. C.: but *Crassus* fell in Parthia; and *Pompey*, venturing to war with Cæsar, was defeated at *Pharsalia*, 48 B. C. Four years after this, *Cæsar* was slain by the Roman senators, and a second *Triumvirate* was formed by Anthony, Lepidus, and Octavius, 43 B. C. By them *Brutus* and *Cassius* were defeated at *Philippi*, 42 B. C.; after which, *Anthony*, joining Cleopatra, was defeated at *Actium*, 31 B. C.; and *Lepidus* having been exiled, Octavius became

* It should be mentioned that all this part of the Roman history has been called in question, by Niebuhr, and other historians.

sole emperor of Rome, under the title of *Augustus Cæsar.* His reign extended to the advent, but not to the crucifixion, of our Lord and Saviour, JESUS CHRIST; with whose birth, erroneously dated, commences the Christian Era.

Among the events which succeeded this great era, were the destruction of *Jerusalem* by Titus, A. D. 70; the overwhelming of *Herculaneum* and *Pompeii* by an eruption of Vesuvius, A. D. 79; the expedition of *Trajan* against Parthia, A. D. 106; the building of the defensive *walls in Britain*, by Adrian, Antonine, and Septimius Severus; the defeat of the Persians by *Alexander Severus*, A. D. 234; the seizure of the emperor *Valerian*, by Sapor, king of Persia, A. D. 260; the defeat of the Goths, by *Claudius*, 269; and the conversion of *Constantine* the Great, a short time before the general *Council of Nice*, A. D. 325. *Constantinople* was made the Roman capital, A. D. 330; and on the death of *Theodosius*, the empire was finally divided, A. D. 395, between his two sons, *Arcadius*, in the East, and *Honorius*, in the West. After the sacking of Rome, by *Alaric*, the Visigoth, A. D. 410; the ravaging of Italy, by *Attila*, the Hun, in 450; and the taking of Rome, by *Genseric*, the Vandal, in 455; the Western Empire was finally overthrown by *Odoacer*, king of the Heruli, who assumed the title of king of Italy, A. D. 476.

§ 7. On the *History of the Byzantine* or *Greek Empire*, the *Eastern Empire* of the Romans, we must here be very brief. The *first division* of the Roman Empire was made A. D. 364; *Valens* ruling the Eastern, and *Valentinian*, the Western; but the *permanent division* commenced A. D. 395, as above mentioned. The most celebrated of the Byzantine emperors was *Justinian*, whose code of Laws, published A. D. 533, is still studied; and whose general, *Belisarius*, reconquered Italy, Spain, and Africa; then died of neglect and want. Constantinople was besieged by the Persians and Arabs, A. D. 626; and afterwards by the Saracens; whose fleet was destroyed by the Greek fire, A. D. 673; and who were again repulsed in 717. *Alexius Commenus* was on the throne, at the time of the first Crusade, A. D. 1096. In the fourth Crusade the Latins took Constantinople, and placed *Baldwin*, count of Flanders, on the throne, A. D. 1204; but it was regained by *Michael Paleologus*, emperor of Nice, in 1261. In the reign of *John Cantacuzene*, the Turks first obtained a firm footing in Europe, and took Gallipolis, in 1357. The empire thenceforward rapidly declined, till Constantinople was taken by *Mohamed* II., who slew *Constantine*, the last emperor, and founded the Turkish empire, on the ruins of the Byzantine, A. D. 1453.

CHAPTER II.

ORIENTAL CHRONOGRAPHY.

Under the head of Oriental Chronography, we would include the remaining History and Antiquities of the Eastern World; that is of those countries which were unknown to the ancient Greeks and Romans; and of all the eastern nations down to the present time. It comprehends of course the whole of Mohamedan History, including that of northern Africa; the only part of Africa whose history has been preserved. We thus draw a dividing line around a large portion of History partly ancient and partly modern; but which we think so distinct, and united, as to deserve a separate position in the arrangement of this wide department of knowledge.

The most prominent feature in this branch, is doubtless the rise and spread of the Mohamedan power, in connection with the Mohamedan religion. Its inroads were marked with devastation and bloodshed; till it grasped the wide region from Spain and Morocco to Turkestan and India; and then, like the preceding empires of the ancient world, fell in pieces by its own unwieldiness. In order to treat successively of the different Mohamedan nations, we shall commence with Arabia, as the source of their doctrines and power; next glance over Northern Africa; and then proceed with the nations of Asia, in geographical order, commencing with Turkey, and proceeding to the more detached states of India and China. We shall conclude this branch with a glance at Oceanica, and central and southern Africa; whose history will henceforward increase in importance to the civilized world.

§ 1. The *History of the Arabians*, before the time of Mohamed, is obscure, and of minor interest. They are called *Saracens*, by the western Mohamedans, from the circumstance of their living in the east. They have never been completely subdued; and though partially conquered by Alexander the Great, they became independent soon after his death. In the times of the Roman emperors, Arabia became a refuge for the Jews and Christians. *Yusof Dhu Nowas*, the last king of the Hamyarate or Homerite dynasty, was a Jew, and persecuted the Christians; for which he was dethroned by Elesbaan, the Christian king of Abyssinia or Ethiopia, A. D. 524. The war of the *Elephant*, between the Yemenites, and the Koreish, took place A. D. 579, ten years after the birth of Mohamed.

Of *Mohamed's* romantic career; his flight from Mecca to Medina, A. D. 622; and his subsequent success till his death in 632; we have already spoken, in treating of Mohamedanism. (p. 137). His successors were called *caliphs*, or vicegerents; of whom *Abubekir* (Aboo-Beker) was the first. *Omar* completed the conquest of Syria, A. D. 637; of Asia Minor in the following year; and that of Egypt in 639. *Othman* (or Osman) saw the conquest of Persia completed in 651. He was succeeded by *Ali*, whom the Sheeahs or Shiites, including the Persians, regard as the first caliph, A. D. 656. (Page 139). Ali was assassinated; and *Moawiyah*, soon after, founded the dynasty of the *Ommiades;* transferring the capital from Cufa to Damascus, A. D. 673. Under *Walid*, the son of Abdalmelek, the rest of northern Africa, and the greater part of Spain, were subdued by the Saracen arms. At length, *Mervan* II. (or Merwan) was opposed, defeated, and slain, by the family of Abbas; and the dynasty of the *Abassides* commenced with *Saffah*, A. D. 750. Abderrahman fled to Spain, and there perpetuated the dynasty of the *Ommiades*, as an independent sovereignty. The caliph *Al-mansor* (or Abu-Giafar) founded Bagdad, A. D. 762, making it his capital; and from this period, the history of Arabia, merged in that of Persia, becomes of minor importance.

§ 2. The *History of Northern Africa*, may properly be completed here, in connection with that of Arabia. Egypt, when the Roman power was divided, became a part of the Eastern, or Byzantine Empire, and remained so, until it was conquered by the Saracens, (or Arabs), under *Amru*, (Amroo), the general of the caliph Omar, A. D. 640; when the Alexandrian Library was finally destroyed. Its history thenceforward is merged in that of Arabia, till *Achmet Ben Tulun*, (or Tooloon), governor of Egypt, threw off the Saracen yoke, and founded the dynasty of the *Tulunides*, A. D. 877. Egypt was regained by the Saracens, under *Moktador Billah*, A. D. 909; but was again independent, under *Akschid*, till 969; when *Morz Ledinillah*, (or Moez Ladinallah), then caliph of Tunis, conquered Cairo, and established the Fatimite dynasty. This was overthrown by *Saladin*, (or Salaheddin); who, being sent by the sultan of Bagdad, against Egypt, usurped the government, A. D. 1170; and becoming master of Syria, fought against the Christians, in the early Crusades. His successors, the *Ayoubites*, were dethroned by the *Mamelukes*, or Turkish slaves in Egypt, A. D. 1250. These were conquered in their turn by *Selim* I., sultan of the Turks; who stormed Cairo, in 1517; when Egypt became a Turkish province, under governors styled *Beys.* Such it continued, excepting the revolt of *Ali Bey*, in 1756–66; and the French invasion, in 1798; till *Mehemet Ali* succeeded the beys, by a stratagem, in 1811, and, soon after, threw off the Turkish yoke, in fact, if not in name. Egypt was recognized in 1839, by the young sultan of Turkey, as an independent state.

The remainder of Northern Africa, including the present *Barbary States*, belonged to Rome, until it was invaded by the Saracens, A. D. 647; and its conquest completed by them, in 709. *Fez* became independent, in 789, under *Edris*, a descendant of Fatema. *Tunis* next became independent, under *Aglab*, the first of the Aglabites, or Agladides, in 805. *Zeïri* built *Algiers*, in 944; and ruled over Tunis and Fez, which were ceded to him by Morz Ledinillah: and his successors, the *Zeïrides*, ruled this coast until Roger, king of Sicily, deprived them of Tripoli, and of most of their territory, in 1148. *Morocco* was founded by *Yoossef*, (Yussef or Joseph), in 1069; and became powerful under his successors, the *Moravides*, (or Almoravites): but in 1269 their empire was divided; and

Algiers, Tunis, and Tripoli, became independent soon after. These states were subdued by *Ferdinand*, of Spain, in 1509; but threw off his yoke, by calling in the aid of the Turkish pirates, *Horuc* (or Aruch) *Barbarossa*, and his brother *Hayradin*, (or Khayr Eddin); the latter of whom surviving, yielded allegiance to the sultan of Turkey, in 1519.

Charles V. of Spain took *Tunis* in 1535, and was prevented from taking Algiers only by the loss of his fleet in a severe storm. Tunis was regained by the Turks, and united with Algiers, till 1586; when a bashaw of Tunis was appointed by the Grand Seignor: but it is at present governed by a Bey, tributary to Turkey. *Algiers*, under its Deys, always piratical, and cruel to Christian prisoners, was humbled by the French, in 1682; again by the British and Dutch, in 1816; and finally subjugated by the French, in 1830. *Morocco*, in 1557, became subject to Mehemed, a *sherif* or descendant of the prophet; and his family still occupy the Moorish throne.

§ 3. The *History of the Turks* or *Turcomans*, commences about the middle of the sixth century; when they revolted from the Geougen Tartars, and soon formed a powerful nation, of which Turkestan was the seat; but they were divided under rival princes, before they conquered Persia. *Togrul Beg*, who founded their second Persian dynasty, was the grandson of Seljook; and hence his tribe were called *Seljooks* by way of distinction. *Malek Shah*, of this dynasty, wrested Asia Minor from the Byzantine empire, about A. D. 1074; but after his death it became a distinct kingdom, under *Solyman*, his general; and it then took the name of Roum, Natolia, or Anatolia. This region was again overrun by *Genghis Khan*, the Mongul Tartar, A. D. 1220; but after his death, it was divided among several *Emirs;* one of whom, *Othman* I., (or Osman), of the Turcoman race, commenced the *Ottoman* or modern *Turkish Empire*, in 1299.

Orchan, his son and successor, took part in the civil wars of the Byzantine empire; and became son-in-law to John Cantacuzene. *Soliman*, the eldest son of Orchan, first invaded Europe, in 1355; and *Amurath*, his second son, and successor, conquered Adrianople and Macedonia. *Bajazet*, (or Bayazeed), was vanquished by Tamerlane the Tartar, in the battle of Ancyra, (or Angora), in 1402; but Tamerlane divided the Turkish possessions among the sons of Bajazet. A civil war was the consequence, till Mohamed, (or Mahomed), the younger brother, became sole monarch, A. D. 1413. His son *Amurath* II., warred against the Byzantines or Greeks, but was resisted by George Castriot, whom the Turks called Scanderbeg; and the conquest of Constantinople was left for the next sultan, *Mohamed* II., in 1453. Since that time, Constantinople, called by the Turks *Stamboul* or *Istamboul*, has been the capital of the Ottoman empire.

Mohamed II., extended his conquests from Trebizond in the east, to Otranto in Italy. His grandson, *Selim* I., conquered Egypt, Syria, and Palestine, in 1517; and assumed the religious dignity of Caliph, or head of the Mohamedan church. *Soliman* II., the Magnificent, called also the lawgiver, took Belgrade and Rhodes, in 1522, and Bagdad soon after; but from this period, the power of the Ottoman Porte began to decline. *Selim* II., conquered Cyprus, in

1571; but his fleet was defeated by John of Austria, at Lepanto, in the same year. *Mohamed* IV. took Candia, in 1669; but lost the greater part of Hungary soon after. *Achmet* III. gave refuge to Charles XII. of Sweden, in 1709; and *Mustapha* III. engaged in a war with Catharine II. of Russia, which terminated unfavorably to him, in 1774. *Selim* III. declared war against France, in consequence of its invasion of Egypt, in 1798; but he and his successor were deposed by the *Janizaries*, originally Christian slaves; and *Mahmoud* II. was raised to the throne, in 1808. In his reign the Greek Revolution took place, and Greece again became free, in 1828; by the aid and intervention of the European powers.

§ 4. The modern *History of Persia*, we shall commence with the Mohamedan conquest of it, begun by *Omar*, A. D. 636, and completed by *Osman*, in 651; when *Yezdegerd* III., (or Jesdijird), the last of the Sassanides, lost his throne. The caliph *Al Mansor*, or Abu Giafar, of the house of the Abassides, after founding Bagdad, A. D. 762, made it the capital of the Saracen empire. Among his successors, *Haroon al Rascheed*, and *Al Mamon*, are celebrated as patrons of learning. *Khorasan*, (Chorassan), or northern Persia, became independent in 820; but was subdued by the Tartars, under *Ismail Samanee*, (or Ishmael), in 902. Persia was thenceforward divided between his family, called *Samanides*, in the north-east, and the Dilemides, in the south-west, till the former were subdued by *Mahmood*, the Turcoman governor of Gazna or Ghizni, who subjugated Khorasan, in 999; and extended his conquests to India. His successors, called *Gaznavides*, were subdued by *Togrul Beg*, the grandson of Seljook, (or Seljuk), in 1037; and by him the Dilemide caliphs of Bagdad were also subjugated, in 1055. The Seljookians, *Alp Arselan* and *Malek Shah*, called *Sultans* of Bagdad, waged war with the Byzantines; and Malek Shah conquered Hindoostan; but left the kingdom in confusion, till it was subjugated by the Monguls, or Tartars, under *Genghis Khan*, (Jengis, Zengis, or Chenghiz Khan), in 1220.

Hulakoo Khan, the grandson of Genghis, encouraged learning; but Persia soon degenerated, till it was again overrun, by another horde of Monguls, under *Timur*, (Timour-lenk), or *Tamerlane*, in 1387. This leader vanquished the Turks, and conquered Hindoostan, before his death, in 1405. Persia remained subject to his descendants, only till 1468, when it was subdued by *Usong Hassan*, (or Uzun Hussun), another chief of the Turcoman race: but he was dethroned, in 1504, by *Ismail Sophi*, (or Ishmael), who, claiming descent from Ali, assumed the title of *Shah*, or king, and founded the Suffavean dynasty. His successors lost several provinces, in wars with the Turks and Usbecks; but these were regained by Shah *Abbas* the Great; who made Ispahan his capital, in 1589. The Afghans, under *Mir Mahmoud*, conquered Persia, in 1722; but held it only seven years: and, in 1736, the throne was usurped by Kooli Nadir, who took the title of *Nadir Shah*, and after conquering Delhi, styled himself Emperor of the Indies. After his death, Georgia revolted from Persia; and the kingdom of Afghanistan was founded, in the east of Persia, by Ahmed Abdallah, who made Cabul (or Kabul) his capital. After a long war, *Kerreem Khan*, (Kerim or Kurrim), who had served under Nadir, acquired the sovereignty of Persia; and fixed his residence at Shiraz, in 1755; but the Shah *Futteh Ali*, (or Feth Aly), whose reign began in 1796, removed the capital to Teheran, probably in order to watch more closely the Russian frontier.

§ 5. The early *History of Hindoostan* is very imperfectly known. The war of the Pandus and Kurus, described in the *Mahabharat*, carried on by *Krishna* and his brother Bali Rama, against Jara Sandha, is usually dated 1391 B. C. The invasions by Sesostris, Darius Hystaspes, and Alexander the Great, have been referred to in the preceding sections. The latter was followed by the wars of *Sandracottus*, (or Chandra Gupta), who usurped the throne of Magadha, and whose daughter was married to Seleucus, Alexander's successor in Persia, about 300 B. C. Antiochus the Great visited India, and made peace with *Sophagasemus*, (or Shivaca Sena), about 120 B. C. The reign of *Vicramaditya*, 56 B. C., is the era from which the Hindoos reckon time. From this era, the race of Bali Rama, or Putras, declined, till it was superseded by *Sipaca*, who founded the dynasty of the *Andharas*, A. D. 151. They ruled over Magadha, comprehending the greater part of Hindoostan, till the death of *Puloman*, A. D. 648; when the country was divided into several small states.

Next came the Mohamedan invasion, by *Mahmoud*, son of Sebectaghin, and king of Gazna, (Ghazna or Ghizni), who took Delhi, A. D. 1011; and thence extended his conquests southward. His dynasty was overthrown, in 1158, by *Kassim Gauri*, king of Gaur, (Ghaour), whose successor, Jya Chandra, was in turn dethroned by *Shahabodien*, in 1194. The empire of Gazna was divided in 1212; when the Persian part became subject to Eldoze, and the Hindoo part to *Cuttub*, (Kutub), who founded the Patan or Afghan dynasty, with Delhi for its capital. This state was partially subdued by *Genghis Khan*, in 1222; and was overrun by *Tamerlane*, (Timur the Tartar), who sealed his conquests in blood, in 1397. Delhi was next taken by *Baber*, (Babur), who founded the Mongul or Mogul dynasty, in 1525. His grandson, *Akbar*, also reduced Cabul and Cashmere, in 1601; and appointed *nabobs* to govern his numerous provinces. Under *Aureng Zebe*, who began to reign in 1657, notwithstanding the wars with Sevajee, (Savajee), chief of the Mahrattas, in the south, the empire rose to its greatest glory. Delhi was again taken by *Nadir Shah*, in 1739; and after his death it became a part of Afghanistan, or East Persia, under *Ahmed Abdallah;* who vanquished the Mahrattas and Ghauts of the south, in 1761. From this period, the Great Mogul of Delhi held only nominal power, till the last who bore this title became a pensioner of the British, in 1803.

The Portuguese settlements in Hindoostan, commenced with the first voyage thither, by Vasco de Gama, in 1498. Ten years after this, *Albuquerque* took Goa from the natives; and the colonies grew rapidly, till the union of Portugal with Spain, in 1580. The *Dutch* soon found their way to India; and, in 1619, fixed their capital at *Batavia*, in Java, which they still hold. By them, most of the Portuguese settlements were taken, about 1660: but they, in turn, were mostly dispossessed by the British. In 1665, a *French* East India company was chartered; and it ultimately secured a permanent establishment at Pondicherry.

The first *British* East India company, was chartered by Queen Elizabeth, in 1600; and twelve years after, it obtained a foothold at *Surat*, by permission of the great Mogul. In 1634, the English also obtained from him a station on the Ganges; and, in 1700, they built Fort William, at Calcutta. In 1708, the company was rechartered, and rival claims and pretensions united. Three *Presidencies* were formed, at Calcutta, Madras, and Bombay; with separate councils. Their political power began with the *Carnatic* war, in 1748; in which the English and French took sides with opposite parties of the natives. In 1756, *Surajah Dowlah*, nabob of Bengal, took Calcutta; but Col. Clive soon regained it, and, by the battle of Plassey, made *Meer Jaffier* nabob; obtaining from him large concessions. By the Peace of 1763, France resigned most of her Hindoo possessions to the British; whose most formidable foe, thenceforward, was *Hyder Ali*, chief of Mysore: but he was defeated in 1780; and *Tippoo Saib*, his son, made peace soon after. Tippoo afterwards renewed the war; but was again brought to terms by Lord Cornwallis, in 1792; and in a third war, the sultan Tippoo was slain, and *Seringapatam* taken by Gen. Harris, in 1799. The Rajah of Nepaul invaded the British possessions, in 1815; but he was defeated by Lord Hastings, and lost a large portion of his territory. Thus has risen the British power in India, which, we hope, may aid in regenerating the east.

The history of *Chin-India*, is so obscure that we shall pass it with the utmost brevity. The religion of Boodha was introduced there in the seventh century; and this region was first visited by the Portuguese, in 1511. *Birmah* became a distinct state soon after; and in 1757, its king, *Alompra*, conquered Pegu. His successors conquered Siam; but it regained its independence. In 1825, the Birmans made war against the British; but they were defeated by Gen. Campbell, with the loss of Arracan, and other provinces.

§ 6. The authentic *History of China*, extends back only to 722 B. C.; Confucius, (or Confu-tsee), being their oldest historian; but their traditionary history begins with *Fohi*, (Foo-hee), whom some suppose to have been the patriarch Noah. The seventh monarch after him was *Yao*, (Yau), in whose reign the Chinese say that the sun did not set for a space of ten days. The first dynasty, that of *Kia*, (or Hia), is said to have commenced with *Yu*, about 1900 B. C. *Poen-keng*, of the second dynasty, that of *Shang*, (Chang, or Yn), is said to have removed, with all his subjects, to a new settlement, 1401 B. C. *Voo-Vang*, (Wu-wang), founded the third dynasty, that of *Chew*, (Tcheoo), 1122 B. C.; and the fourth, or *Tsin* dynasty, commencing 256 B. C., included the famous *Shee-hoang-tee*, (Chi-hoang-ti), called also *Ching*, (Tching), who united the scattered provinces, founded many cities, and commenced the great wall, to defend the northern frontier. He is said to have burned the ancient historical books, 213 B. C., except those of Confucius, which were accidentally saved.

The fifth, or *Han* (Hang) dynasty, was founded 202 B. C., by *Lieoo-pang*, captain of a band of robbers, who was afterwards called Kao-tee. The Roman emperor, Marcus Aurelius, is said to have sent an embassy to China, A. D. 166, when the Chinese first became known to him. China was divided, A. D. 220, between the families of *Oey*, (Goei), and *Ou*, (Oo): and, though united under *Voo-tee*, (Wu-ti), founder of the seventh or *Tsin* (Tsin-ou-ti) dynasty, in 265, it was again divided, in 386; the northern empire being founded and governed by the Goli Tartars; and the southern by the *Oo-tay*, (U-tai), or Five Families, which reigned there in succession. China was again united under *Yang-kien;* who assumed the name of *Ven-tee*, and founded the twelfth or *Sooy* (Soui) dynasty, A. D. 581. Under *Tay-tsong*, of the next or Tang dynasty, literature flourished, and China grew powerful. The usurper *Shoo-ven*, (Shu-wen), or *Tay-tsoo*, founded the fourteenth or *Heoo-Leang* (Hehu-Lang) dynasty, A. D. 907; which, with the four following dynasties, all feeble, were called the *Heoo-oo-tay*, (Hehu-u-tai), or the five later families. The nineteenth imperial dynasty, that of *Song* or Sing, founded by *Shao-quang yu*, (or Tchao), under the name of *Tay-tsoo*, in 960, continued till the Tartar conquest, in 1278.

The eastern Tartars had founded an empire of their own, in northern China, as early as A. D. 907; and the *Niutche* (or Niu-cheng) Tartars, coming into power in 1118, forced the Chinese to pay tribute. This induced the latter to invite in the *Mogul* (Mongol or Mong-koo) Tartars, under *Genghis Khan;* who subdued the Niutches in 1209, and then turned his arms against the Chinese themselves. His descendant, *Kublay Khan*, called by the Chinese *Ho-pie-lie*, (Hou-pilay), completed the conquest of China, and taking the name of *Shee-tsoo*, (Shi-tsu), founded the twentieth or *Yuen* dynasty in 1278, the eighteenth year of his reign. The Tartars were again expelled from China, by *Shoo*, (Chu), who took the name of *Tay-tsoo*, (Tai-tsoo IV.), and founded the twenty-first or *Ming* dynasty, in 1368. But China was again subdued by the *Man-tchoo* Tartars, a remnant of the Niutches, (Niudshees), under *Sunshee*, (Shun-chi), who took the name of *Shee-tsong*, and founded the twenty-second imperial dynasty, that of *Ta-tsin*, (Tsing, Tsim, or Tatim), in 1644; which still occupies the throne. *Kien-Lung* was emperor at the time of Lord Macartney's embassy, in 1792.

§ 7. The *History of Central* and *Southern Africa*, is brief and obscure; consisting chiefly of an account of the modern discoveries made, and colonies founded, by the Europeans. *Abyssinia*, the ancient Ethiopia, was imperfectly known during the middle ages, although it had been converted to Christianity in the third century; but we must pass over its history till the Portuguese mission of Covillan, about 1490; whose reports hastened the discovery of the southern passage to India. In 1516, the Portuguese aided the native king, David, in recovering his throne from the Turks; and, in 1543, they extended like aid to *Claudius*, the next *negus* or king. The Roman Catholic religion was established there in 1604; but overthrown in 1632, by the negus *Basilides* or Facilidas. The country has since been involved in civil war, and is now divided, into the states of Amhara, Tigré, and Shoa Efat. *Melinda*, in eastern Africa, was taken by the Portuguese, about 1500; but recaptured by the Arabs in 1698. *Mosambique*, taken by the Portuguese in 1508, still remains in their possession; and the Portuguese settlements in Lower Guinea were formed at about the same time.

The *Cape of Good Hope*, was colonized by the Dutch, in 1615. It was taken by the British in 1795; and again in 1806; since which time it has remained in their possession. In 1787, the *African Association* was formed, in England, by Sir Joseph Banks and others, for the purpose of exploring the interior of Africa. (p. 179). In the same year, *Sierra Leone* was colonized by negroes from England; and being surrendered to the British crown in 1807, it has since been made the home of negroes rescued from slave ships. In 1807, the *African Institution* was formed in England, by Sharpe, Clarkson, Wilberforce and others, for the abolition of the slave trade, and the civilization of the Africans. Slaves were carried by the Portuguese, from Africa to the Spanish American colonies, as early as 1503. The traffic was legalized by Spain, in 1517; and sanctioned, soon after, by France and England. The United States and England abolished this trade in 1808; France, finally in 1815; Spain, in 1820; and Portugal, nominally in 1823. The *American Colonization Society*, was formed in 1816; to colonize in Africa the free colored people of the United States. *Liberia* was purchased by it in 1821; and settled by the first emigrants in 1822; under Governor *Ashmun.*

A few words on *Oceanic History*, must here suffice; as the progress of discovery in Oceanica has already been traced. (p. 192). *Java*, was first colonized by the Portuguese, soon after its discovery; but taken from them by the Dutch; who, in 1619, made it the capital of their Indian possessions. *Sumatra*, was settled by the Dutch, in 1666; and the English also formed there the settlement of Bencoolen, in 1685; which in 1825 they ceded to the Dutch, in exchange for Malacca. *Celebes*, was taken from the Portuguese, by the Dutch, in 1667; and, with it, the monopoly of the Spice Islands. The colony of *Botany Bay*, was founded in 1788, by the British; who took formal possession of the eastern part of New Holland, in 1824; and commenced a western Australian colony, in 1829. *Van Diemen's Land* was colonized by them, at Hobart's town, in 1804. The *Philippine Islands* were settled by the Spaniards, in 1570.

CHAPTER III.

EUROPEAN CHRONOGRAPHY.

In the branch of European Chronography, we include the History and Antiquities of Europe; excepting those of ancient Greece and Rome, included in *Euclassic;* and of Turkey, included in *Oriental* Chronography. Here, therefore, we are to speak of all the Christian nations of modern Europe; tracing them back individually to the earliest accounts of their origin and growth; and thence, through the middle and modern ages, to the present time. The History of Europe, is that of our own ancestors, and that of modern civilization and improvement. It is a chapter often stained by scenes of crime and bloodshed, and by the struggles of arbitrary power, against the rights and interests of humanity. But though darkened thus at intervals, it has its brighter hues; its redeeming features; and the retrospect affords us strong grounds for hoping that, under the influence of Christian philanthropy, the cause of truth and justice will yet prevail throughout the world.

The present nations of central and western Europe, arose from the fragments of the Roman Empire: and, sharing in its religion and laws, they constitute together a family of nations. Most of them were united under Charlemagne; and notwithstanding their divisions, wars, and quarrels, their intercourse was maintained by the spread of the Papal power, the fellowship of the Crusades, and the spirit of Chivalry. The age of Charles V., again saw the wielding of colossal power in the west; but it witnessed a far mightier change in the prospects of the civilized world. The introduction of the compass; the application of gunpowder; the invention of printing; the opening of the marine route to India; the discovery of America; and the protestant Reformation; all conspired to give that impetus to the human mind which neither tyranny nor superstition have yet been able to arrest.

We proceed to the history of the European nations; commencing with that of Italy, and thence following the geographical order, adopted in the preceding department. The Greek revolution, which resulted in the establishment of *Otho*, of Bavaria, on the throne of Greece, has already been alluded to, under Turkish history. (p. 213).

§ 1. The *History of Italy*, properly commences with that of the Papal power; which extended, in the middle ages, not only to Italy, but to all the western and central parts of Europe; overshadowing the power of kings, by an influence mightier than that of the sceptre. Of its origin, we have already spoken under Ecclesiastical History; (p. 147). Its growth was vigorous under *Leo* I., the Great, in the fifth century, and *Gregory* I., the Great, in the sixth. In 606, *Boniface* III., was declared *Universal* Bishop, by the tyrant Phocas; but *Theodore* I., who died A. D. 649, first received the title of *sovereign pontiff*. Although the popes exercised secular authority, they had no territorial dominion till 755; when Pepin the Short, king of France, made over to Pope *Stephen* III., twenty-two cities in Italy, which he had taken from the Exarch of Ravenna. From this period, the papal power extended rapidly in the west; aided much by the forged *decretals*, ascribed to Isidore, and which greatly exaggerated the power of the early Roman bishops. In the year 800, Pope *Leo* III., conferred on Charlemagne the ancient crown of the Cæsars, saluting him emperor of the West; and in 875, Pope John VIII., elevated Charles the Bald to the throne of France.* In 1080, Matilda, countess of Tuscany, bequeathed a large territory to Pope

* In 1039, three popes, chosen by bribery, were living together at Rome; all of them obnoxious, from their immoral character

Gregory VII.; which became the cause of much subsequent contention with the German emperors. Gregory VII. first decreed the celibacy of the clergy; in order to bind them more closely to the hierarchal service.

The papal power was greatly increased by the *Crusades*, or wars of the Cross, against the Mohamedans, for the recovery of Jerusalem. The first was commenced in 1096, under Peter the Hermit, a monk patronized by pope *Urban* II.; and three years after, Jerusalem was taken by Godfrey of Bouillon, and his associates. In 1147, a *second Crusade* was got up by St. Barnard, and Pope *Eugene* III., to sustain the Christians in the East; in which Louis VII. of France, and Conrad III. of Germany, failed of success. The *third Crusade* was begun in 1188, by Richard I. of England, Philip Augustus of France, and Frederick Barbarossa of Germany, stimulated by Pope *Clement* III., to recover Jerusalem, which the Turks had retaken, ten years before. Richard defeated Saladin and the Turks at Ascalon, in 1192; but ended this crusade by a truce with them soon after. The *fourth Crusade*, began in 1202, under Baldwin, count of Flanders, who went no farther than Constantinople: and the fifth and *last Crusade*, made in 1248, by St. Louis (Lewis IX.) of France, ended with his capture, and ransom, in Egypt, soon after.

In 1177, Pope *Alexander* III., compelled the emperor Frederick of Germany to hold his stirrup, and kiss his foot: and in 1198, Pope *Innocent* III., subjected Rome itself to the temporal power of the papal chair. Under him, the *Inquisition* was founded, in 1204, by the agency of Dominic de Guzman; being first aimed against the Reformers in France; and next against the Jews in Spain. Pope *Boniface* VIII., was imprisoned, in 1303, by Philip the Fair of France; and from 1308 to 1377, the popes resided at Avignon. In 1378, two popes were chosen at the same time; *Clement* VII., by the French; and *Urban* VI., by the Italians. This division is called the great *schism of the west*. The council of Constance, convoked in 1414, by the German emperor, Sigismund, deposed John XXII., and proclaimed itself superior to the pope.

The *Reformation*, begun by Luther in 1517, (page 154), and which neither the power nor the policy of *Leo* X. could suppress, has liberated the half of Christendom from ecclesiastical usurpation. To counteract this, the order of *Jesuits* was founded, in 1536, by Loyola, under Pope *Paul* III.; (p. 154); its members promising implicit obedience to the papal power; and their professed object being the conversion of heretics and the heathen. Their machinations led to their suppression, in the last century, by most of the European sovereigns: but not to their extinction. Pope *Sixtus* V., who died in 1590, has been called the last Roman pontiff that kings had reason to fear. Pope *Pius* VII., was forced, in 1801, to buy his personal freedom of Bonaparte; and owed his restoration, in 1814, at least in part, to the protestant states of England and Prussia. In restoring the Jesuits, and opposing the dissemination of the Bible, he only followed the maxim of his predecessors, "never to give up the slightest claims, but to wait for opportunities."

Italy presents a sad example of the effects of division, and discord, among the members of a great nation. We shall first glance over its connected history; and then refer to its separate divisions. *Odoacer*, king of the Heruli, having overthrown the western, or Roman empire, A. D. 476, assumed the title of king of Italy. He was defeated and slain, in 493, by *Theodoric*, king of the Ostrogoths, (Eastern Goths), assisted by the Visigoths, (or Western Goths): and the Gothic kingdom in Italy continued till it was overrun by Narses, the Byzantine general, in 552; by whose agency *Alboin*, king of the Lombards, became king of Italy in 568. The last Lombard king, *Didier*, was dethroned by *Charlemagne* of France, who united Italy to his own domains, in 774. Under his descendants, Italy was alternately separated from and united with France, till *Otho* I., the Great, of Germany, became its master, and was crowned emperor of the Romans, in 962.

Otho and his successors allowed many of the Italian cities to have separate republican governments: the chief officers of each being two consuls, elected annually. These cities, with their dependent territories, were styled the *Italian Republics;* among which were Milan, Pavia, Lodi, Florence, and Pisa. Venice and Genoa were also called republics; their chief officer being styled the *doge*. These states were frequently engaged in contests with each other, and involved in broils with the popes and German emperors. In the war between Milan and Pavia, in 1129, arose the distinction of the *Guelfs*, (Guelphs), and *Ghibelines*, (Gibelins). The Guelfs, so called from the family of Welfs in Germany, including the duke of Bavaria, favored the pope, and Lothaire of Saxony; while the Ghibelines, named from Wibelung or Waiblinga, a German castle in Franconia, espoused the cause of *Conrad* of Hohenstaufen, of the house of Swabia. In general, the Guelfs, and the house of *Este* were the partizans of the popes; and the Ghibelines, headed by the family *Da Romano*, favored the German emperors. But we have no room to pursue this complicated subject farther.

Venice became a distinct state as early as A. D. 697, when its first *doge* was elected; but the present city was built in 809. It grew rapidly in the time of the Crusades; and enjoyed the chief commerce of the east, till the discovery of the southern passage to India; after which it began to decline. Cyprus was ceded to Venice in 1486; but taken by the Turks in 1571; who also took Candia in 1699. Venice continued free till the French Revolution; which resulted in its final subjection to Austria, in 1814. *Milan* became a duchy under Visconti, in 1395; subject to Spain, in 1535; and it has belonged to Austria since 1706, except during the French Revolution. In 1815 it was united with Venice, to form the *Lombardo-Venetian* kingdom, which is now a part of the Austrian empire.

Genoa, became a republic in 953, and was for a long time second only to Venice, in commerce and wealth. It was engaged in long wars with Pisa; and contended with Venice, for the dominion of the Mediterranean. The former wars ended in 1284, in the defeat of the Pisans; and the latter in 1381, in the peace of Turin, with Venice. Genoa continued independent till the French Revolution; but was incorporated with France in 1805; and finally assigned to the kingdom of Sardinia in 1815. *Savoy* became a distinct county in 1016; a duchy in 1416; and a kingdom, from the peace of Utrecht in 1713; the island of Sardinia being annexed to it in 1720, under *Amadeus* II. It was invaded by the French in 1798; but reinstated as a kingdom, under the name of *Sardinia*, in 1815, by the Congress of Vienna.

The kingdom of the *Two Sicilies*, (Naples and Sicily), was founded by Norman adventurers; and became a duchy under Robert Guiscard, in 1060; and a kingdom under *Roger* II., in 1130. When his family became extinct, in 1189, the kingdom fell to Henry VI. of Germany, and to his descendants, till it was granted, in 1254, by the pope, to *Charles of Anjou*, brother to Louis IX. of France. Sicily revolted from his reign, and by the massacre of the *Sicilian vespers*, in 1282, the French were extirpated from Palermo. The French were expelled from Naples in 1458, by *Alphonso* V. (Alfonso) of Arragon; after which Naples was connected successively with Spain and Austria, till it was conferred on *Ferdinand* of Spain, in 1759. Since that time, it has remained a distinct kingdom.

Tuscany, became a grand-duchy in 1569, under Cosmo de' Medici. On the failure of his line, in 1737, it passed to Francis, duke of Lorraine; and from him to the house of Austria, to which it still remains subject; though entirely distinct from the Austrian empire. Of the other Italian duchies we have no room here to speak.

§ 2. The *History of Spain*, commences with its settlement by the Phœnicians; who built Cadiz, it is said, 900 B. C. It was invaded by the Carthaginians, about 500 B. C.; and partially held by them till the end of the second Punic war, 201 B. C.; when it was ceded to the Romans; though not completely subdued by the latter, till the time of Augustus. On the decline of the Roman power, Spain was invaded, and mostly subdued, by the *Vandals*, Suevi, and Alans, A. D. 406; but about 419, the *Visigoths*, under *Wallia*, became its masters, and drove the Vandals into Africa. The Catholic religion was introduced into Spain, in 586, under *Reccared* I. In 712, this country was invaded by the Moors; and *Don Roderick*, who had usurped the throne, was defeated at *Xeres*, by Tarik, sent from Barbary; who thus subjected Spain to the caliphate of Bagdad. In 756, *Abdalrahman* rendered Spain independent; and established the caliphate of *Cordova*, the seat of Moorish learning. This caliphate became divided, about 1038, among several Moorish princes.

Meanwhile, as early as 718, *Pelagius* the Goth, retiring to the mountains of Asturias, founded the kingdom of *Leon;* which became united with *Castile*, in 1037, under *Ferdinand* I. Barcelona became a distinct county in 801; and was united with Arragon, in 1162, under Raymond, surnamed *Alphonso* II. By these Christian powers the Moors were gradually driven back; and by the battle of *Tolosa*, in 1220, they lost all Spain except Granada in the south. After the marriage of *Ferdinand* V. of Arragon, styled the Catholic, with *Isabella* of Castile, in 1479, their forces were united against the Moors; and the conquest of Granada was completed in 1492. This success induced Isabella to patronize Columbus; while Ferdinand's fame was tarnished by the introduction of the Inquisition. *Charles* I.

of Spain, the grandson of Isabella, came to the throne in 1516, and soon after became emperor of Germany, under the title of *Charles* V.; as heir to his father, Philip, archduke of Austria. The rivalry of Francis I. of France, led to a war, in which Francis was taken prisoner, and confined till the peace of Madrid, in 1526; which left Charles the most powerful monarch of Europe, with the wealth of America at his command.

Charles resigned the Spanish crown, in 1556, to his son *Philip* II.; whose intolerance and religious wars, and especially the *armada* sent against England, but destroyed in 1588, exhausted his resources, and weakened the nation. The expulsion of the Moors, by *Philip* III., in 1609, and the loss of Portugal during the reign of *Philip* IV., accelerated this decline. *Charles* II. appointed Philip of Anjou to be his successor: and this led to the war of the *Spanish Succession*, in which France and Spain supported Philip; but England and Holland aided Germany, in favor of the emperor Leopold. This war began in 1701, and ended with the peace of *Utrecht*, in 1713; by which Philip retained the crown, under the title of *Philip* V.; but lost many of its foreign possessions. Under *Charles* III., Spain united with France, in aiding the United States of America to secure. their independence; and in 1782, those powers attempted, but in vain, to take Gibraltar from the English. The difficulties between *Charles* IV. and his son *Ferdinand* VII., invited the interposition of Napoleon; who in 1808, placed his brother, *Joseph Bonaparte*, on the Spanish throne. In the wars which followed, the French were expelled, and Ferdinand restored, in 1814; by the aid of the English. *Isabella* II., the daughter of Ferdinand, is now the queen and sole monarch of Spain.

The history of *Portugal*, belongs to that of Spain, till *Henry of Burgundy*, having assisted Alphonso VI. of Castile and Leon against the Moors, was appointed by him, A. D. 1094, to be governor of the provinces around Oporto; and *Alphonso* I., the son of Henry, having defeated the Moors at Ourique, was at once saluted king of Portugal, in 1139. In 1383, the direct line of Burgundy having become extinct, the crown was conferred on *John* I. of the same family. His son, *Henry*, the Infante, surnamed the Navigator, set on foot those enterprizes which opened the way to the Indies, in the reign of *John* II. In 1580, the crown becoming vacant, was seized by *Philip* II. of Spain; and held by that power till 1640, when the Portuguese placed *John of Braganza*, of the old royal family, upon the throne. In the reign of *Joseph* I. the Jesuits were banished from Portugal, in 1759; and reforms were made in the government. After the French Revolution of 1789, Portugal became involved in the wars with France; and in 1807, the regent *John* VI. sailed to Brazil, leaving the country in the hands of the French; but it was restored to him by the peace of Paris, in 1814. In 1821, John returned to Portugal, leaving his son Don *Pedro*, to govern Brazil, which became independent in 1825. *Maria* II. (Donna Maria), the daughter of Pedro, now occupies the throne of Portugal.

§ 3. The *History of France*, commences with that of the *Gauls*, its ancient inhabitants; whose subjugation to the Roman empire was completed by Julius Cæsar, in the year 50 B. C. The ancient Cherusci, afterwards styled *Franks*, or freemen, began to migrate from Germany to France as early as A. D. 264; and at length, having defeated the Romans, at Soissons, in 486, they founded the *Frankish empire*, including France and Germany, under *Clovis*, grandson of Merovæus, and head of the Merovingian dynasty. His successors were mostly weak monarchs; and after the death of *Dagobert* II., in 638, the *mayors of the palace* became possessed of the principal power. Their office became hereditary, in the family of Pepin Heristel: whose son *Charles* defeated the Saracens from Spain, near Tours, in 732, and hence was surnamed *Martel*, or the Hammer. His son, *Pepin the Short*, (le Bref), was proclaimed king of France in 751; with whom commenced the second or Carlovingian dynasty. *Charles*, the son of Pepin, having subdued the Lombards, and become monarch of Italy, Germany, and France, was crowned *Emperor of the West*, by Pope Leo III., in 800; taking thenceforward the name of *Charlemagne*, or Charles the Great.

The grandsons of Charlemagne, sons of *Louis Debonnaire*, contended for the crown before their father's death; and fought with each other the battle of *Fontenoy;* after which, by the treaty of Verdun, in 843, Italy was assigned to Lothaire; Germany, to Louis; and France, to *Charles the Bald*. This dynasty continued till the death of *Louis* V., in 987; when *Hugh Capet*, count of Paris and Orleans, founded the third, or Capetian dynasty. From this time, the royal power, favored by the clergy and the common people, began to predominate over that of the nobles; thus undermining the Feudal system. In 1087, France, under Philip I., was invaded by William the Conqueror, of England; but without success. Louis VII. took part in the second Crusade, in 1147; *Philip* II. (Augustus), joined in the third, in 1188; and *Louis* IX. (St. Lewis), led the fifth and last Crusade, in 1248, but without success. (See p. 219). The kingdom of France was, for a long time, extremely limited; Flanders, Champagne, Burgundy, and several other states being independent; while a large part of northern and western France belonged to England.

In 1328, *Philip* VI., of the house of Valois, a branch of the Capetian race, ascended the throne. The pretensions of Edward III. of England, to the French crown, led to a war, in which the English were victorious at *Cressy*, in 1347; and they took Calais soon after. *John* II., the successor of Philip, was defeated at *Poictiers*, in 1356; and carried a prisoner to London. *Charles* V., the Wise, was more successful; but in the next reign, the French were again defeated at *Agincourt*, (or Azincourt), in 1415. *Charles* VII., aided by Joan of Arc, raised the siege of Orleans in 1429; and regained all of France, which had been held by the English, except Calais. *Louis* XII., of Orleans, was succeeded in 1515, by *Francis* I., of Angoulême; who contested the crown of Germany, in a war with Charles V. (See p. 222). This war, after the release of Francis, was renewed, till the peace of *Crespi*, in 1544. The reign of *Charles* IX., was stained by internal religious wars, and by the massacre of

St. Bartholomew's eve, in which 30,000 Huguenots (Protestants) were assassinated.

The wars which followed this event, placed *Henry* IV., the Great, upon the throne; and thus was founded the Bourbon dynasty, in 1589. *Louis* XIII. took part in the *Thirty years' war*, against the emperor of Germany; which was begun in 1618; and continued during the minority of *Louis* XIV., styled the Great, till the favorable peace of Westphalia, in 1648. This latter king was a party in the war of the *Spanish succession*, ending with the peace of Utrecht in 1713; which gained the crown of Spain for his grandson, but weakened the power of France, irretrievably. *Louis* XV. took part in the war of the *Austrian succession*, against the claims of Maria Theresa to the Austrian crown; which, however, she retained by the peace of Aix-la-Chapelle, in 1748. He also took part in the *Seven years'* war, against Frederick II. of Prussia; and thereby lost Canada, by the peace of Paris in 1763.

Louis XVI. aided the United States in gaining their independence; but fell a victim to the *French Revolution*, which was provoked by the despotism and corruption of the government. It broke out in 1789; and he was guillotined four years afterward. *Napoleon Bonaparte* was appointed first consul of France in 1799; and crowned emperor in 1804. After a long career of victory, he was defeated at *Leipsic*, in 1813; and soon after abdicated the crown, and retired to Elba. Returning to France, in 1814, after the brief triumph of the *Hundred days*, so called, he was again defeated at *Waterloo;* and *Louis* XVIII. received the crown of France, from the victorious allied powers. In 1830, his successor, *Charles* X., was expelled for usurpation; and the *Three days* Revolution resulted in proclaiming *Louis Philippe* of Orleans, king of the French, by the will of the people.

§ 4. The *History of Great Britain*, extends back to its discovery by the Phœnicians, probably soon after the founding of Carthage, or 878 B. C. It was unknown to the Romans, until the time of *Julius Cæsar;* who invaded and conquered the southern part of it, 54 B. C.: but the conquest of England was completed by *Agricola*, about A. D. 70. On the decline of Rome, *Valentinian* III. withdrew his legions, in 426, and left the Britons to their fate. Being harassed by the Scots and Picts, they called to their aid the Saxons, from Germany; who, under *Hengist* and *Horsa*, came in 449, and at first protected, but afterwards subjugated the inhabitants. The Saxons soon formed seven small kingdoms in Britain, known as the *Heptarchy;* which were at length united, in 828, by *Egbert*, king of Wessex; and they then received the name of *England*, from the Angles, who had united with the Saxons. From this time, England was exposed to the ravages of the Danes. They were defeated and brought to terms by *Alfred* the Great, in 893; who made London his capital, and greatly improved the kingdom. After the cruel massacre of the Danes in 1002, their countrymen, under *Sweyn*, (or Sueno), again assailed England; and *Ethelred* II. fled to Normandy, till the death of Sweyn in 1014; when he returned. His son *Edmund* II. (Ironside) was also defeated by the Danes; whose leader *Canute* the Great, became sole king of England, in 1017;

but the Danes were finally expelled, in 1041, by *Edward* the Confessor, of the Anglo-Saxon line.

On the death of Edward, *William* I., the Conqueror, invaded England; and defeating Harold of Wessex, at *Hastings*, in 1066, he seized the crown, and established the Norman dynasty, in the same year. On the death of *William* II. (Rufus), his brother *Henry* I. (Beauclerc) usurped the throne in 1100: but having no sons, he was succeeded by his nephew, *Stephen* of Blois, in 1135. *Henry* II., son of Geoffrey Plantagenet, and grandson of Henry I., next obtained the throne, in 1154; and with him began the line of the Plantagenets. *Richard* I., (Cœur de Lion), engaging in the third Crusade, was detained prisoner in Austria, till ransomed in 1194; and his weak brother *John*, succeeding him, was compelled by the Barons to grant the *Magna Charta*, or great charter against royal oppression, in 1215, at Runnymede. Under *Henry* III. the *House of Commons* was first constituted, in 1265. *Edward* I. (Longshanks) subdued Wales, in 1283, and gained a foothold in Scotland: but *Edward* II. was defeated by Robert Bruce, at Bannockburn, in 1314. *Edward* III., claiming the crown of France, in right of his mother, engaged, with his son, Edward the Black Prince, in a successful war with France, already referred to. (p. 223).

In the reign of *Richard* II., commenced the rivalry between his uncles, the dukes of Lancaster and York. *Henry* IV. (Bolingbroke), son of the former, seized the crown in 1399, and thus the house of Lancaster occupied the throne. This led to the wars of the *Roses;* the white rose being the badge of York, and the red, that of Lancaster. *Henry* V. invaded France, and was victorious at Agincourt, in 1415; but his conquests were lost by *Henry* VI.; from whom the crown also was wrested by *Edward* IV. of York, who thus superseded the house of Lancaster, in 1461. *Richard* III., the Cruel, was slain in the battle of Bosworth, in 1485, and succeeded by *Henry* VII., son of Edmund Tudor, who by his marriage united the rival interests, in the house of Tudor. The quarrels of *Henry* VIII. with the pope, led to the abolition of papacy, in 1533, and the *Reformation*, or introduction of the Protestant religion. The short reigns of *Edward* VI. and the bigoted *Mary*, were followed, in 1558, by that of *Elizabeth;* who supported the Protestants, and triumphed over the *Armada*, or fleet, sent against her by Spain, in 1588. On her death, *James* VI. of Scotland, (James I. of England), son of Queen Mary Stuart, inherited the crown, and thus permanently united Scotland with England and Ireland, under the house of Stuart, in 1603.

His son, *Charles* I., usurping extreme powers, was beheaded in 1649, in a Revolution; by which *Oliver Cromwell* became Protector of the Commonwealth. *Charles* II., son of Charles I., regained the royal power in 1661; but his brother and successor, *James* II., aiming to reëstablish papacy, was driven from the kingdom by the *Revolution* of 1689, (1688 o. s.), which placed *William* III. of Orange, and *Mary*, the daughter of James, upon the throne. France thereupon made war against Great Britain; but concluded the peace of Ryswick, in 1697. Queen *Anne*, took part in the war of the Spanish succession, against France and the Bourbons; and her general, the duke of Marlborough, aided by the Germans under Prince Eugene, gained the battles of *Blenheim* in 1704, Ramilies in 1706, *Oudenard* in 1708, and Malplaquet in 1709; thus inducing the peace of Utrecht, in 1713.

Anne was succeeded in 1714, by *George* I. of Hanover, great-grandson of James I.; and with him commenced the dynasty of Brunswick. *George* II. took part in the war of the Austrian succession, in aid of Maria Theresa; till the peace of Aix-la-Chapelle, in 1748. By the seven years' war, against France and Germany, ending in the peace of Paris, in 1763, *George* III. gained Canada; but by unjust exactions and uncompromising measures, he lost the United States, in a war ending with the peace of Paris, in 1783. In his time occurred the French Revolution, and the rise of Bonaparte; against whom Great Britain, fearing his exorbitant power, took a decisive part. Her armies and her wealth at length procured his downfall, doubly sealed by the last great battle of Waterloo, in 1814. *George* IV. began to reign in 1820; *William* IV. in 1830; and *Victoria* in 1837.

Scotland, was probably first settled by the Celts, and afterwards by the Picts, who resisted the Roman power; and *Walls* were built by the Romans to prevent their inroads. The *Scots* or Dalriads from Ireland, migrated thither under their leader, *Fergus*, A. D. 503; and *Kenneth Mac Alpine* first united the Scots and Picts under one reign, in 843. *Malcolm* I., who gained the crown in 943, received Cumberland from the English, on condition of guarding their northern frontier; and *Malcolm* II., in 1004, defeated the Danish invaders, and finally made peace with Sweyn, their king. *Malcolm* III., who began to reign in 1057, was the son of Duncan, who was murdered by Lady Macbeth. On the death of *Alexander* III., in 1284, Edward I. of England, as umpire between Bruce and Baliol, gained a nominal sovereignty, by favoring the latter; but *Bruce*, (*Robert* I.), defeated the English at Bannockburn, in 1314, and became king of Scotland.

On the extinction of his line, *Robert* II., of the house of Stuart, (or Stewart), ascended the throne in 1371. *James* I. was murdered by his nobles, in 1437; and *James* III. slain during a rebellion, in 1488. *James* IV. married Margaret, daughter of Henry VII. of England, thus giving to his heirs a claim to the English crown; but he fell at the battle of Flodden, in 1513. *James* V., in alliance with France, opposed the Reformation; but in vain. His daughter and successor, the beautiful *Mary Stuart*, was cruelly beheaded, by order of Queen Elizabeth, in 1587: but her son, *James* VI. of Scotland, inherited the crown of Elizabeth, and became sole king of Great Britain, in 1603, as already mentioned; though Scotland continued to be a distinct kingdom, till the act of Union, in 1707.

Ireland was peopled by the Celts, and known to the Phœnicians, at an early age; but its history has not been well preserved. It was divided among several rival clans, till *Brian Boroihm* united them mostly under his sceptre, about the year 1000, of our era. In 1172, Henry II. of England, taking advantage of a quarrel between Dermod of Leinster and Roderick O'Connor, landed with an army in Ireland, and subdued all of it except the province of Ulster; which fell to the

English, by intermarriage, in 1361. The fate of Ireland has been peculiarly unfortunate; but we have no room to trace it farther.

§ 5. We come next to the *History of Central Europe;* including that of all the Germanic nations. The early inhabitants of Holland, the *Batavi* and *Frisii*, were subdued successively by the Romans, and the Franks; and formed a part of the Frankish empire, till the partition at Verdun, A. D. 843; when Holland was attached to Germany. On the abdication of Charles the V., in 1556, Holland, with the adjacent provinces, constituting the *Netherlands*, (or Lowlands), was united with Spain, under Philip II. His severe treatment caused Holland and Zealand to rebel against him in 1572; and five other provinces joined them, at Ghent, in 1576. The *seven United Provinces* under *William of Orange* as Stadtholder, declared themselves independent, in 1579; though not recognized so by Spain, till the close of the Thirty years' war, and peace of Westphalia, in 1648. At this period, they were the first commercial nation in the world: the Dutch East India Company, formed in 1602, having engrossed the commerce of the East.

The other ten provinces, called *Flanders*, or *Spanish Netherlands*, now *Belgium*, were ceded by Spain, at the peace of Utrecht, in 1713, to the house of Austria, which held them till the French Revolution; when they were taken by France, in 1794. The French also took Holland in 1795; forming of it the *Batavian Republic;* which Bonaparte, in 1806, converted into the *kingdom of Holland*, under his brother *Louis Napoleon.* On the fall of Bonaparte, in 1814, the whole seventeen provinces were erected into the kingdom of the *United Netherlands*, under *William* I. of Orange. But in 1830, the ten Belgic provinces revolted from his rule, and the kingdom of *Belgium* was organized in 1831, under *Leopold* of Saxe Coburg.

Switzerland was also conquered successively by the Romans, and the Franks; by the latter A. D. 534. Its western part, was included in the *kingdom of Burgundy*, in the south-east of France, founded by *Rodolph*, in 888; which kingdom, on the death of *Rodolph* III., in 1032, was reunited to Germany. Switzerland was again independent, under the dukes of *Zähringen*, till 1218; when it reverted to Germany. The tyranny of the emperor Albert, led the Swiss to unite, in 1307, and throw off the German yoke; in which they succeeded, after a series of bloody wars, terminating with the peace of Basle, in 1499. By the French Revolution, Switzerland was, in 1798, converted into the *Helvetic Republic;* but in 1814, the former state was restored; and the Cantons of Switzerland remain an independent confederation.

Germany, was first invaded by the Romans, under Julius Cæsar, 55 B. C.; but he only succeeded in checking the German irruptions into Gaul. During the decline of Rome, the leading tribes of Germany were the *Cherusci* or Franks, in the north, and the *Allemanni*, in the south: but the latter were subdued by *Clovis*, king of the Franks, A. D. 496; after he had defeated the Romans in France. Germany thus became a part of the *Frankish empire*, down to the time of *Charlemagne.* (p. 223). By the peace of Verdun, which settled the quarrels of Charlemagne's grandsons, *Louis*, (the German), became the first emperor of Germany, as a distinct state. His son, *Charles*, (the Fat), reacquired France and Italy, by inheritance; but, being a weak prince, resigned the crown in favor of *Arnold*, (or Arnulph), in 888. With *Lewis*, the son of Arnold, the Carlovingian race became extinct; and the empire then became elective. *Conrad* of Franconia was chosen emperor, in 912; and *Henry* I., (the Fowler), of the house of Saxony, was raised to the throne, in 919. He and his successors, the first three *Othos*, enlarged and improved the empire.

On the death of *Henry* II., in 1024, the crown was conferred on *Conrad* II., of the Salic tribe, and house of Franconia. His grandson, *Henry* IV., was deposed by Pope Gregory VII., and compelled to do penance, barefoot, at Rome, in 1076; but he, in return, deposed Gregory, and appointed another pope. On the death of *Lothaire* II., in 1139, the crown was given to *Conrad* III., of the house of Swabia, or Hohenstaufen, who was supported by the Ghibelines. *Frederick* I., Barbarossa, engaging in the third Crusade, was drowned in the river Cydnus, in Cilicia, in 1190. *Otho* IV., of Brunswick, received the crown in 1208: but after the death of *Conrad* IV., and a confused interregnum, the choice fell on *Rodolph* I., count of Hapsburg, in 1273; and from him sprang the house of Austria. The quarrels of *Louis* IV. of Bavaria, with Pope John XXII., led to the first *Pragmatic Sanction*, in 1338; by which the electors declared Germany independent of the pope. *Charles* IV., of Luxembourg, issued in 1356, the *Golden Bull*, (from *bulla*, a seal), fixing the laws of the empire. (p. 110).

On the death of *Sigismund*, of Hungary, in 1438, his son-in-law, *Albert* II., duke of Austria, was elected emperor; and from this time the house of Austria became predominant in Germany. *Maximilian* I. united in the League of Cambray, in 1508, against Venice; but without success. His grandson, *Charles* V., inherited Spain from his mother; and was elected emperor, in 1519; in opposition to Francis I. of France, with whom he was engaged in five successive wars. Charles abdicated the throne in 1556, in favor of his brother *Ferdinand* I., leaving Spain and the Netherlands to his son Philip. In the reign of *Matthias*, commenced the Thirty years' war, in 1618, between the Imperialists, or *Catholic League*, and the Protestants, or *Evangelical Union:* the latter ultimately aided by Sweden and France. This war continued under the reigns of *Ferdinand* II., whose army was defeated by Gustavus Adolphus, at Lutzen, in 1632; and of *Ferdinand* III., who was opposed by Torstenson, Conde, and Turenne, till the peace of Westphalia, in 1648.

The claim of *Leopold* I. to the crown of Spain, for his son, led to the war of the Spanish succession, in 1702, in which England and Holland aided Leopold, against France: (p. 222): but at the peace of Utrecht, in 1713, Spain fell to the Bourbons. The *Pragmatic Sanction* of *Charles* VI., securing his crown to his daughter, Maria Theresa, queen of Hungary, led, on his decease, in 1740, to the war of the *Austrian succession;* in which that queen, aided by England, was opposed to Charles of Bavaria, aided by France and Prussia. By the peace of Aix-la-Chapelle, in 1748, *Francis* I. of Lorraine, the husband of Maria Theresa, was recognized emperor of Germany. The *Seven years' war*, was brought on by Maria Theresa, aided by France, with a view to regain Silesia from Frederick II. of Prussia, who was assisted by England; but her efforts were in vain, and terminated in the peace of Hubertsburg, in 1763.

On the breaking out of the French Revolution, *Leopold* II. formed a league with Prussia, at Pilnitz, in 1791, to sustain the Bourbons in France. This led to the invasion of Germany by the French, and their victories at Jemappe, 1792; Marengo, 1800; and Austerlitz, 1805; over the Germans and their allies. *Francis* II. assumed, in 1804, the title of *Emperor of Austria:* and in 1806, after sixteen German princes, protected by France, had formed the *Confederation of the Rhine*, he resigned the title of *Emperor of Germany*, which then became extinct. After the fall of Bonaparte, and by the peace of Vienna in 1815, confirmed by the Congress of Vienna in 1820, the states of Germany were united in the *Germanic Confederation*, consisting of four free cities, and thirty-four monarchical states, including Austria, Prussia, and Denmark, in right of their Germanic possessions; of which we have already spoken, in treating of Geography. (p. 176). The history of the exclusively German states, as Bavaria, Saxony, Hanover, Wurtemburg, and Brunswick, we have no room to pursue any farther.

The *History of Austria*, commences with the conquest of the country around Vienna, by the Romans, A. D. 33; and their subsequent expulsion by the Vandals, Goths, Huns, Lombards, and Avars. These last were expelled, in 791, by *Charlemagne;* who united this country to Germany, as a part of his empire. In a document of *Otho* III., dated 996, it is called *Ostirrichi* (Oest-reich) or the eastern kingdom; and in 1156 Austria was created a duchy, under *Henry*, its first duke. In 1282, after the extinction of the house of Bamberg, this duchy was conferred on *Albert*, of the house of *Hapsburg;* who was afterwards elected emperor of Germany; but it was not until 1438, commencing with *Albert* II. (the Magnanimous), that the dukes of Austria became hereditary emperors of Germany. In 1453, Austria became an arch-duchy, and on the acquisition of Bohemia and Hungary in 1526, it attained to the rank of a European monarchy. The marriage of *Maria Theresa*, who was queen of Hungary, arch-duchess of Austria, and empress of Germany, placed *Francis* I., of the house of *Lorraine*, on the throne of the empire; as already mentioned under the history of Germany; in which the subsequent history of Austria is included. By the peace of Vienna, in 1815, Austria was recognized as an independent and powerful empire; and such, under the present emperor, *Ferdinand*, it still remains.

Prussia, was conquered from the Sarmatians, Vandals, and Suevi, by the *Teutonic Knights*, under *Herrman* of Salza, their grand master; who was invited thither by Conrad of Masovia, A. D. 1227. Their conquest was complete in 1283; but not satisfied with this, their invasions of the neighboring country led to a bloody war with Poland, in 1454. In 1511, the Knights elected *Albert* of Brandenburg, to be their grand master; who, in 1525, aided by the Poles, abolished their order, and converted Prussia into a hereditary duchy, as a fief of Poland. Albert belonged to the ancient house of *Hohen Zollern*, which still occupies the Prussian throne. In the reign of Duke *Frederick William*, grandson of John Sigismund, Prussia again became independent of Poland, by the treaty of Welau, in 1657: and the next duke, *Frederick* III., in 1701, raised Prussia to the rank of a kingdom, assuming the regal title of *Frederick* I.

The next king, *Frederick William* I., greatly improved his country; and *Frederick* II., the Great, conquered Silesia, from Maria Theresa, in the war of the Austrian succession; (p. 228); retaining it by the separate peace of Breslau, in 1742. In the Seven years' war, which followed this, he was assailed by Germany, France, and Russia; but defended himself with wonderful skill and valor, and retained Silesia by the Peace of Hubertsburg, in 1763. Frederick the Great, and his successor, *Frederick William* II., both shared in the unjust partitions of Poland; the latter in 1795. The late king, *Frederick William* III., declared war, unaided, against Bonaparte, in 1806; but the battle of Jena led him to seek the unfavorable peace of Tilsit, in 1807. He again took part against the French, in 1813–14; and thus preserved his throne, and the integrity of his dominions. He was succeeded, in 1840, by his son, the present king, *Frederick William* IV.

The first ruler of *Denmark*, is said to have been *Skiold*, (or Schiold), about 60 B. C.: but the history of those times is involved in fable. After the Roman decline, the inhabitants became formidable to their neighbors; being known in France as *Normans*, or Northmen, and in England, as *Danes*. *Ragner Lodbrog*, who began to reign A. D. 750, invaded England, but was captured, and put to death. The more certain history of Denmark, commences with the reign of *Gormo*, the old, (Sormo, or Surm), in 863. His son, *Harold*, was converted to Christianity; and his grandson, *Sweyn*, (Swane, or Sueno), commenced the conquest of England, which was completed by *Canute* II., the Great, in 1016. Denmark flourished under *Waldemar* I., who came to the throne in 1157; and still more under the celebrated *Margaret*, who, in 1388, united Sweden with Norway, under her sceptre. *Christian* I., was elected king of Denmark, as a separate state, in 1448; and its final separation from Sweden took place in 1523; when the *Danish Revolution* placed *Frederick* I. on the throne.

Christian IV. took part in the Thirty years' war; at first against the Imperialists; but afterwards against Sweden; till the peace of Brömsebro, in 1645. *Frederick* IV. waged war against Charles XII. of Sweden; but was soon coerced into the peace of Travendahl, in 1700. Under *Christian* VI., Denmark, uniting in the Northern Confederacy, was involved in a dispute with Great Britain; and its fleet was defeated at Copenhagen in 1800. In 1807, the British seized the Danish fleet, to prevent its being employed in aid of the French. Denmark was thus provoked to unite with Bonaparte; in consequence of which she was obliged to give up *Norway*, to Sweden, by the peace of Kiel, in 1814. *Christian* VIII. succeeded to the throne of Denmark in 1839.

§ 6. We shall commence the *History of Northern Europe* with that of Norway and Sweden; concluding it with that of Poland and Russia. *Sweden* had its kings of *Upsal*, as early as the fifth century; and they claimed descent from *Odin*, (or Woden); who appears to have flourished before the Christian era. Sweden is said to have been united with Denmark, under *Gormo* I., in 714, and until the death of *Ragner Lodbrog;* but no longer. A more settled government was established in 994, by *Olaf*, (Olof or Olaus), its first Christian monarch. In 1250, *Eric* XI., first of the house of Folkung, subdued the interior of Finland. In 1363, the Swedes rebelled against *Magnus* III., (Smek), and gave the crown to *Albert* of Mecklenburg: but he fell in the battle of Falköping, in 1388; and Sweden became subject to Queen *Margaret* of Denmark. In 1448, the Swedes and Norwegians seceded, and elected *Charles* VIII., (Karl Knutsen), to be their king. *Christian* II. of Denmark, again united the three countries, in 1520; but his tyranny produced the *Swedish Revolution*, in 1523, which placed *Gustavus Vasa* (Wasa) on the throne of Sweden, thenceforward a prominent state.

Gustavus Adolphus engaged in the Thirty years' war, in support of Protestantism; but fell in the battle of Lützen, in 1632, in the midst of his success against the Imperialists. His daughter, *Christina*, resigned the crown, in 1654, to *Charles* X., (Gustavus), of Deux Ponts. *Charles* XII., the rash and brave, being called to defend his territories, humbled Denmark in 1700, and Poland in 1703; but he was at length defeated by Peter the Great of Russia, at *Pultowa*, in 1709; which event decided the result of the *Northern War*, so called. *Adolphus Frederick*, of Holstein, succeeded the house of Vasa, in 1751; and took a slight part in the Seven years' war. In 1810, *Charles* XIII. accepted the nomination of the French marshal, John Bernadotte, (Prince of Ponte Corvo), to be crown prince; and this officer succeeded, in 1818, to the Swedish throne, under the title of *Charles* XIV.; with the consent of the allied powers, whom Sweden had ultimately aided against Bonaparte.

Norway, appears to have been united with Sweden, till its conquest was begun by Sweyn, and completed by *Canute* of Denmark, in 1028. It became independent again, soon after; and had its separate line of kings, till *Hacon*, (Hakon, Haquin, or Hager), king of Norway, married *Margaret*, daughter of Waldemar III. of Denmark, in 1363. Hacon died in 1380; when Margaret became queen of Norway, and on the death of her son, *Olaf* IV., (Olave or Olaus), in 1387, she became also queen of Denmark; as in the following year, of Sweden. Norway, with Sweden, seceded from Denmark, in 1448: but these countries were again united, in 1520, under *Christian* II. of Denmark; and from this time Norway continued in union with Denmark, till 1814, when by the peace of Kiel, it was again united to Sweden.

Poland, became a duchy, A. D. 842, under *Piast;* and was converted to Christianity about 964, under Duke *Mieczyslas*, of the Piast family. Its first king was *Boleslas* I., (Chrobry), called the Terrible; who crowned himself, in 1024, the last year of his reign. *Boleslas* III., in 1138, divided the kingdom among his sons; and thus subjected it to a civil war. *Casimir* III., the Great, formed a written code of laws; and founded the Academy at Cracow. He was succeeded, in 1370, by his son-in-law, Jagellon, grand-duke of Lithuania; who took the name of *Ladislaus* V., (or Uladislas), the first of the house of Jagellon. In the reigns of *Sigismund* I., commencing in 1506, and *Sigismund* II., (Augustus), commencing in 1548, Poland acquired large territories, and became the leading Northern power. On the death of the latter, in 1572, the house of Jagellon became extinct; and Poland, thenceforward an elective monarchy, fell, at length, a prey to internal factions.

The most illustrious of the remaining monarchs, was *John Sobieski*, who aided Austria in defeating the Turks at Vienna, in 1683. His successor, *Frederick Augustus*, of Saxony, involved Poland in the wars against Charles XII. of Sweden; but was defeated by Charles, whose influence deprived him of his throne, in 1704. The last king, *Stanislaus Poniatowski*, was elected by the influence of Catharine II. of Russia; who took advantage of Poland's dissatisfaction and dissensions, to deprive it of a national existence. The first partition was made, in 1772, by Catharine II. of Russia; Frederick II. the Great, of Prussia; and Joseph II., of Austria. The final partition, was begun, in 1792, by Catharine II., Frederick William II., and Francis II.; and, in despite of the efforts of *Kosciuszko* and his compatriots, Poland was completely dismembered, in 1795, and her name blotted from the list of nations.

The first civilized inhabitants of *Russia*, appear to have been the *Sclavonians:* who, in the fifth and sixth centuries, built Kiev and Novgorod. The *Varangians*, (Warangians), a piratic tribe from the Baltic, entered Russia, and made *Ruric*, their leader, its first duke, A. D. 862. His great-grandson, *Vladimir* I., (or Wladimir), the Great, embraced Christianity, in 987; and *George* I., (or Jurge), built Moscow, in 1147. Russia was invaded by *Tamerlane*, in 1395; and became subject to the Tartars, till they were subdued, in 1477, by *John Basil*, (Ivan Vasilovitz, or Iwan Wasiliewitsch), who united the country under one government, and assumed the title of *Czar*, or king. *John Basil* II., conquered the kingdom of Astrachan, in 1554; and *Theodore*, (Feodor), his successor, conquered Siberia, in 1587. In 1613, the house of Ruric being extinct, *Michael Theodore Romanoff* (Romanow) was elected czar, with absolute and hereditary power.

In 1689, *Peter the Great* became sole ruler of Russia; with whom commenced its rapid progress in power and civilization. He defeated Charles XII. of Sweden, at Pultowa, in 1709; and built St. Petersburg. In 1757, his daughter, *Elizabeth*, assisted Austria against Prussia, in the Seven years' war; and her successor, *Catharine* II., took part in the unhallowed partition of Poland. The emperor *Alexander* took an active part in the French Revolutionary wars; and though he concluded the peace of Tilsit with Bonaparte, in 1807, his opposition to French measures commenced the war of 1812. The destruction of Moscow, in that year, saved Russia from the French invasion: and it is now a first-rate European power, under the government of the emperor *Nicholas* I.

CHAPTER IV.

AMERICAN CHRONOGRAPHY.

The History of America, is involved in the deepest obscurity, prior to its discovery and colonization by the western nations of Europe. America is called, by them, the *Western World*, as they reach it most easily by sailing westward; and the *New World*, from its having been known to them only in comparatively recent times. Of its discovery by Columbus, who first visited the mainland of this Continent in 1497, we have already spoken, under North American Geography. (See p. 183). Columbus supposed these lands to be a part of the Indies, known to the ancients; and hence called them by the same name. But after *Amerigo Vespucci* (Americus Vespucius) of Florence, had visited the new world in 1499, and described it in glowing colors, and after *Balboa* had discovered the Pacific Ocean, in 1513, the name of the Florentine was ungenerously applied to the continent, and the name of West Indies, was confined to the group of islands first discovered by Columbus.

The origin of the American Indians, or aborigines, is not fully ascertained. There are strong reasons for believing that the *Esquimaux*, in the North East, came from Greenland; and their ancestors from Northern Europe. The other tribes probably came from Asia, the great cradle of the human race; but at two or more different periods. The earlier race appear to have occupied a part of the United States, and to have left those mounds and antiquities, here discovered; but afterwards to have been driven southward, by new and more barbarous hordes, till they finally settled in the more congenial regions of Mexico and Peru. The resemblance of their pyramids, and other antiquities, to those of India and Egypt, strongly indicates their common origin; but whether they came by the way of Behring's Straits, in an age when Siberia enjoyed a milder climate; or whether across the Pacific Ocean, from island to island; or whether there was formerly a communication between the continents, by land since submerged, we are unable to decide. The resemblance of our Northern Indians to the Tartars of Northern Asia, we think, strongly indicates that they are of the same stock; with less difference between the two races, than there is, in either race, between different tribes.

In treating of American History, we shall adopt the geographical order, of the preceding department; commencing at the north.

§ 1. The *British Provinces*, in North America, were originally possessed and settled by the French; the first considerable settlement being that of *Quebec*, founded in 1608, by Champlain, a French naval officer. In 1628, a company of French merchants obtained, by the favor of Cardinal Richelieu, the exclusive privilege of trading with Canada; which however they resigned in 1664. From this time, the colony became more flourishing; so much so as to attempt the capture of New York in 1689; and to repulse the expedition against it, from New England, under Sir William Phipps, in 1690. In the Seven years' war, Canada was again invaded, by three British armies, in 1759. That under Gen. *Wolfe*, took Quebec; though Wolfe was slain: Gen. Amherst took Ticonderoga; and Gen. Prideaux took Niagara, from the French: and the three armies met at Montreal; which capitulated, in 1760. By the peace of Paris, in 1763, Canada and Michigan were finally ceded to Great Britain. In 1775, the American Revolution having commenced, Canada was invaded by an army from the United States, under Gen. Montgomery; but without success. In 1791, Canada was divided into the two provinces of Upper, and Lower Canada; with separate colonial governments. In 1812, it was again invaded by the Americans, but without success; and notwithstanding the attempted Revolution in 1837, Canada is still subject to the British government; the two provinces having been again united in 1841.

Nova Scotia, was first settled by the French, probably about 1600; and named by them Acadia. In 1621, it was granted by James I. to Sir William Alexander; and received its present name: but in 1632 it was restored to France. *Louisburg*, on Cape Breton, was captured by the English, aided by the New England colonies, in 1745; but restored to France by the peace of Aix-la-Chapelle, in 1748. The second capture of Louisburg, in 1758, secured to Great Britain the permanent possession of Nova Scotia. By the peace of Paris, in 1763, its boundaries were so defined as to include *New Brunswick;* which, however, was made a separate province in 1785. *Prince Edward's Island*, was chartered as a distinct province, in 1770; and *Newfoundland*, in 1832. The *Hudson's Bay* fur company, was chartered by Charles II., in 1670; the *North West* fur company, was formed at Montreal, in 1783; and they were united some time after, retaining the former name. The fur trade to the North West coast of America, was commenced as early as 1784, and prosecuted at first chiefly by traders from the United States. In 1821, an attempt was made by Russia to monopolize this trade; but it was abandoned in 1824.

§ 2. The *History of the United States*, is of peculiar interest; and rich in political instruction. We have no room here to speak farther of the aborigines, or of geographical discoveries in our country; already briefly referred to. The first permanent settlement made in the United States, was that of *Jamestown*, Va., in 1607, by Capt. Christopher Newport, under the patronage of the London Company. In 1613, the Dutch settled *Albany;* and in the following year, they settled *New York;* naming the country New Netherlands. In 1620, the Puritans, a pious congregation, originally from England, came from Holland to *Plymouth*, Mass., and commenced the settlement of New England. The Dutch probably commenced settlements in *New Jersey*, prior to 1623, when it was settled by Swedes and Danes. *Delaware*, was settled by the Swedes, in 1627. *New Hampshire*, was settled by the English, in 1623; and *Maine*, by the Plymouth company, in 1630. Boston was founded in 1630, by Gov. Winthrop; and *Maryland* was first settled, at Baltimore, in

1634, by Mr. Calvert. *Connecticut* was settled, at Windsor, in 1633; and *Rhode Island*, at Providence, by Roger Williams, in 1636. *North Carolina* was settled from Virginia, in 1650; and *South Carolina*, at Port Royal, by William Sayle, in 1670: but the present city of Charleston was founded in 1680. *Pennsylvania* was probably settled by the Swedes, in 1627; but Philadelphia was founded by William Penn, in 1682. *Vermont* was not settled till 1725; nor *Georgia*, till 1733.

Meanwhile, notwithstanding the hardships endured, and wars engaged in with the Indians, the colonies increased rapidly in numbers and in strength. Among the earlier *Indian Wars*, were those in Virginia, in 1618, 1622, and 1644: in Maryland, in 1642; the *Pequot war*, in Connecticut, in 1636–7; and the *Narragansett war*, in Rhode Island, in 1675–6. There was a war between the Dutch and Indians in New York, in 1646; and in 1664, New York and the other Dutch colonies were subjugated by the English, who thus consolidated their territory. Still, the colonies were hemmed in by the French; and they suffered severely in the *French and Indian Wars*, consequent to the wars between France and England. In the first of these wars, ending with the peace of Ryswick, the French and Indians burnt Schenectady, in 1690. In the war of the Spanish succession, the Indians burnt Deerfield, Mass., in 1704, and ravaged the Carolinas: but the French were repulsed from Charleston, in 1706; and Port Royal, Nova Scotia, was taken by the colonists, in 1710. In the war of the Austrian succession, the colonies aided in taking Louisburg from the French, in 1745; and D'Anville's fleet, sent against the colonies, was disabled by a storm, in the following year. The French encroachments on the Ohio, the subject of Washington's mission, in 1753, led England to take part in the Seven years' war; in which Braddock was defeated, in 1755; and the French took Oswego in 1756; and Fort William Henry, N. Y., in 1757; but afterwards, by a series of defeats, they were deprived of Canada, and all their northern possessions, by the English, in 1760.

In 1764, Great Britain, by the Stamp act, commenced that oppressive system of taxation, which led to the assembling of a Colonial Congress, in 1765; and the organization of a *Continental Congress*, from all the colonies, except Georgia, in 1774; which appointed General Washington to be Commander-in-Chief of the American forces, in 1775; and issued the *Declaration of Independence*, July 4th, 1776. The first blood was shed at *Lexington*, in 1775; and followed by the battle of *Bunker's Hill*, and the expedition to Canada, in the same year. In 1776, the British evacuated Boston; but they were successful at *Brooklyn*, and *White Plains*. Washington retreated to New Jersey; and there turned the tide of success, by the victory at *Trenton*, near the close of the year. In 1777, the British were defeated at *Princeton*, N. J.; and at Bennington, Vt.; and after the battles of *Stillwater* and *Saratoga*, the British army, under Burgoyne, surrendered to General Gates. Meanwhile, the British were successful at *Brandywine*, and *Germantown;* and took possession of Philadelphia, until the following summer. They were, however, defeated at *Red Bank;* and in 1778, at *Monmouth*, N. J.;

as also by General Sullivan, on *Rhode Island:* though, in return, they took *Savannah.* In 1779, *Stoney Point* was taken from them by General Wayne: but in 1780, they took *Charleston;* and defeated General Gates, at *Camden*, South Carolina. They were partially defeated at *King's Mountain;* and in 1781, at *Cowpens*, by General Morgan; but were more successful at *Guilford*, and in the second battle at *Camden.* They were again defeated by General Greene, at *Eutaw Springs*, South Carolina; and finally, being besieged at *Yorktown*, their army under Lord Cornwallis, surrendered to Washington, aided by La Fayette, and our French allies, under Count Rochambeau, in 1781. The British evacuated New York, soon after the peace of Paris, in 1783, by which Great Britain acknowledged the independence of the United States.

Of the framing of the Constitution, and its adoption in 1788, we have already spoken. (p. 111). *General Washington* was chosen the first president of the United States; and the first *Constitutional Congress* met in New York city, in 1789. From this period, the country flourished; and the settlements extended rapidly, west of the Alleghany mountains; notwithstanding the Indian Wars, in that quarter. The bloodiest of these wars, was that with the *Miamis:* who defeated General Harmer, in 1790; and General St. Clair, in 1791; but were subdued by General Wayne, in 1794. *Michigan*, had been settled by the French, at *Detroit*, in 1670; *Illinois*, in 1683; and *Indiana*, in 1690. *Tennessee*, was settled, at Fort Loudon, in 1757; *Kentucky*, by Daniel Boon, in 1775; and *Ohio*, by New England emigrants, in 1788. *Alabama*, was first settled by the French, in 1702; and *Mississippi*, by them, in 1716; but both states were afterwards held by the English, as a part of Georgia. In 1800, under the presidency of John Adams, the city of *Washington* was made the capital of the United States. In 1803, under the presidency of Thomas Jefferson, the region called *Louisiana* was purchased of France, for $15,000,000. The state of *Louisiana*, was first settled by the French, in 1699; and New Orleans founded in 1717. *Arkansas*, was settled by them, in 1685; and *Missouri*, in 1763.

Under the presidency of James Madison, the British aggressions on our commerce, caused the declaration of *War against Great Britain*, in 1812. That year saw the surrender of Detroit, and the repulse of our troops at Queenstown; but it saw also the capture of the British frigates *Guerriere*, by Capt. Hull; *Macedonian*, by Decatur; and *Java*, by Bainbridge. In 1813, the Americans were defeated at the River Raisin, but they took *Fort York*, and *Fort George*, U. C. They lost the frigate Chesapeake; but Commodore Perry captured the British fleet on Lake Erie. The northern Indians, taking part with the British, were defeated by General Harrison; and the Creek Indians by General Jackson, and others. In 1814, the British were defeated by General Brown, at *Chippewa*, and *Bridgewater;* repulsed, at North Point, where they landed to attack Baltimore; and defeated at *Plattsburg*, by General Macomb. They took the frigate Essex; but lost their fleet on Lake Champlain, which was captured by Macdonough. In 1815, General Jackson defeated the British at

New Orleans; and the war was terminated by the *peace of Ghent.* In the same year, a brief war with Algiers was concluded; and the United States thenceforward released from paying tribute.

Under the presidency of James Monroe, *Florida* was ceded by Spain to the United States, in 1821; on the payment of $3,000,000: but it had been settled by the Spaniards, at least as early as 1565; and held by the British from 1763 to 1781. Vermont was admitted into the Union, in 1791; Kentucky, in 1792; Tennessee, in 1796; Ohio, in 1802; Louisiana, in 1812; Indiana, in 1816; Mississippi, in 1817; Illinois, in 1818; Alabama, in 1819; Maine,.and Missouri, in 1820; Arkansas, in 1836; and Michigan, in 1837. Of subsequent events under the presidencies of J. Q. Adams, Jackson, and Van Buren, down to the recent death of the lamented Harrison, we have no farther room here to speak.

Texas, was a part of Mexico, till it formed a separate constitution, in 1832, and declared itself independent, in 1835. This declaration has been sustained, not only by the victory of General Houston over the Mexicans, at San Jacinto, in 1836; when General Santa Anna was taken prisoner; but by various other and more recent successes. Texas is now substantially independent, under the presidency of General Lamar.

§ 3. *Mexico*, appears to have been inhabited by a race called *Toltecs*, (Toltecas, or Toultecs), who emigrated from the north, as early as A. D. 544, or 648. They were displaced, in 1178, or 1196, by the *Aztecs*, who founded the city of Tenochtitlan, now *Mexico*, in 1325. This country was invaded by *Fernando Cortez*, in 1519; who, with a single regiment of Spaniards, marched to the capital, and was received by the emperor, *Montezuma*, as a god, and child of the sun. Having ruined Montezuma, and captured his successor, *Guatimozin*, Cortez, in 1521, completely subjugated Mexico to the Spanish crown, under the name of *New Spain.* By the year 1596, the Spanish settlements were extended from Yucatan to the Rio Del Norte, and California. The last insurrection of the natives was in 1692; when the viceroy's palace was burnt; but the Indians were subdued.

Mexico remained in general tranquillity, till 1810; when the partiality exhibited by the administration, towards the Spaniards, led to an insurrection of the *Creoles* or natives. In 1813, a national Congress was assembled at Chilpanzingo, which declared Mexico independent. *Augustin Iturbide*, (Yturbide), being sent by the Spanish government, against the revolutionists, united with them in effecting their independence; and in 1822, he was proclaimed emperor of Mexico: but he was banished in the following year; and returning thither, was arrested and shot, in 1824. Since that time, Mexico has been nominally a representative republic; though often the scene of tumult and civil war. In 1831, *General Bustamente* succeeded Guerrero as president; which office, with some brief intervals, he has held till the present time. In 1835, by a decree of the Mexican Congress, the state legislatures were suppressed; and the government became a central republic: but since that time, in many of the provinces, it has possessed only nominal power.

The present republic of *Central America*, comprises the old kingdom of *Guatemala*, which was subdued by the Spaniards, under Pedro de Alvarado. He set out from Mexico, for this purpose, in 1523, under the orders of Cortez; and, after several battles, and the death of *Tecum Umam*, the native king, the invaders founded the city of Guatemala, in 1524. From that time the country remained under a *Captain general*, subordinate to Mexico, till, in 1821, it declared itself independent; and in 1824, adopted a federal constitution, similar to that of the United States. The first president was Don *Manuel Jose Arce;* but that office is now held by *General Morazan.* This country has suffered from insurrections; and in 1838, the city of Guatemala was taken by the insurgent General Carrero, when Salazar, the vice president, was slain.

Of the *West Indies*, *Hayti*, or St. Domingo, called by Columbus, *Hispaniola*, (or Little Spain), was colonized by him, immediately after its discovery, in 1492; this being the first European settlement, at least in modern times, in America. The French obtained a foothold in the western part of this island, about 1650; and that part was ceded to France by the treaty of Ryswick, in 1691. The French Revolution led to an insurrection in this colony, in 1791, and to the enfranchisement of the negroes, by the French National Assembly, in 1792. In 1801, Hayti was proclaimed independent, by the African population; the whites having been mostly massacred, or expelled. In 1804, Dessalines assumed the title of *James* I., (Jacques I.), emperor of Hayti: but he was slain in 1806; and succeeded by Christophe; who defeated Petion, and, in 1811, styled himself *Henry* I., king of Hayti. *Boyer* succeeded him, in 1820; and in 1821, the Spanish part of the island voluntarily submitted to his government; under which the whole island still remains. *Cuba*, was subdued in 1511, by the Spaniards, under Velasquez, sent from Hayti. It was taken by the English, in 1762; but exchanged by them for Florida, in 1763; since which time it has continued under Spanish dominion. *Jamaica* was colonized in 1509, by the Spaniards: but the English took its capital, in 1596; and completely subdued the island, in 1655.

§ 4. We proceed next to the history of South America; still pursuing the geographical order of countries.

Brazil was settled by the Portuguese, soon after its discovery; and in 1549, *Thomas de Souza*, (or Sousa), was appointed its governor. St. Salvador was founded by him in the same year. In 1624, Brazil was invaded by the Dutch; and in 1630, their admiral, Henry Lonk, or *Conk*, with a large fleet, attempted its entire conquest. They succeeded in taking seven provinces of the fifteen; but afterwards sold them back to Portugal. The *gold mines* of Brazil, were discovered in 1698; and the diamond mines, in 1782. Brazil was still farther favored, by the arrival thither of the royal family of Portugal, in 1808; as the grant was then made to it of free trade with foreign nations. In 1815, Brazil was erected into a distinct kingdom; and in 1820, it obtained a constitution, from the crown prince, Don Pedro. In 1821, the king, John VI., returned to Portugal; and in 1822, his son, the regent, *Don Pedro*, was declared constitutional emperor of

Brazil. In 1831, the latter, on returning to Portugal, abdicated the throne, in favor of his son, *Pedro* II.; who is now the reigning emperor.

Guiana was settled, about 1634, by a party of Englishmen and Frenchmen; and the British took formal possession of it, in 1650. It was taken by the Dutch, in 1667; and ceded to them, in exchange for New York. Other settlements were afterwards formed, by the Spaniards, English, French, and Portuguese; of which our limits allow no farther mention.

§ 5. *New Grenada*, was first visited by Columbus, in 1502; on his fourth voyage. In 1508, it was mostly granted to Ojeda and Nicuessa: but in 1514, it was granted anew to Avila, under the name of *Terra Firma*. In 1536, *Benalcazar*, one of Pizarro's officers, invaded the southern part of it; and, in 1547, it was completely subdued, and made a *captain generalship*, dependent on the Spanish crown. In 1718, it was erected into the *viceroyalty* of New Grenada; and such it continued most of the time, until the Revolution; by which, in 1811, it declared itself independent. It was again subjected to Spain, in 1816, by the victories of Morillo; but again emancipated, in 1819, by *Bolivar*, who effected its union with Venezuela, to form the republic of *Colombia*. In 1830, dissatisfaction having arisen, this republic was divided; when New Grenada again became a separate and independent republic; of which *Marquez* is now president.

Venezuela, after being colonized by the Spaniards, was sold, by Charles V., to the Weltzers, a German mercantile company: but, in 1550, it was erected into the *captain generalship of Caraccas*. From this time, it remained under the Spanish government, until 1806; when *General Miranda* attempted to effect a revolution; but failed. In 1810, a *Junta Suprema*, or Congress, was convened in Caraccas; which, in 1811, declared the country independent, under the title of the *Confederation of Venezuela*. In the war which followed, Venezuela was defended by *Bolivar;* and, in 1819, he effected its union with New Grenada; as has just been mentioned. In 1829, Venezuela again declared itself independent; and *General Paez* was chosen its president. He was succeeded, in 1835, by Dr. Vargas; but has since been reappointed to this office.

Equador, was a part of the empire of the Peruvian Indians; and after the Spaniards took the city of Quito, in 1534, it still remained attached to Peru; till in 1564, it was erected into the *Presidency of Quito*, dependent only on the Spanish crown. From 1717 to 1722, it was united with New Grenada; after which, it continued distinct, till the Revolution; which began in 1809, and ended in 1822, in the union of Quito with the republic of *Colombia*. In 1831, Quito was made a separate and independent republic, called *Equador*, (or Equator), of which *Rocafuerte* is now president.

Peru, was a distinct kingdom, long before the Spanish invasion. The Peruvian Indians attributed their civilization to *Manco Capac*, who is supposed to have lived in the early part of the twelfth century. His successors were the *Incas* or kings of Peru; till in 1525, Francisco Pizarro and Diego Almagro sailed from Panama, with a small force; and taking advantage of a civil war, soon subdued the country;

seizing the Inca, *Atahualpa* or Atabalipa, and putting him to death. In 1535, the Spaniards founded the city of Lima; and in 1543, the president of the *audiencia*, or court of Lima, was appointed governor of *Peru*. *Tupac Amaru*, the last of the Incas, was vanquished, and put to death, in 1562. There were several revolts of the natives; the most important of which was that headed by another Tupac Amaru, in 1780: but they were all suppressed. When Spain was subdued by the French power, in 1808, Peru began to meditate her independence: but this was not effected till 1821; when General *San Martin*, at the head of a Chilian army, expelled the Spaniards from Lima, and was declared protector of the *Peruvian republic*. The Spaniards again took Lima, in 1823, but were expelled by *Bolivar*, acting as dictator; and the battle of Ayacucho, in 1824, gained by General Sucre, sealed the independence of Peru. The suspected ambition of Bolivar, then president of Colombia, led to a war between that republic and Peru, which terminated in 1829. Peru was divided, in 1836, into North, and South Peru; and from 1837 to 1839, it was united with Bolivia; but it is now a distinct government, under the presidency of General Gamarra.

Bolivia, was a part of Peru, until 1778; when it was united to Buenos Ayres. It shared in the revolution which commenced in 1809; but, in 1825, it declared itself a distinct republic, under the above name. General *Santa Cruz* was elected its president in 1829; and, in 1837, Peru was placed under his protection; thus forming the *Peru-Bolivian Confederation*: but this was dissolved by a revolution in Peru, in 1839; and Bolivia then became once more a distinct government, under General Velasco.

§ 6. Of the more southern Spanish possessions, *Chili* was invaded by Almagro, in 1535, without success; but *Valdivia*, sent by Pizarro, founded Santiago, in 1541, and Conception, in 1550. He was afterwards defeated by the *Araucanians*; a warlike native tribe, who have never been subdued by the Spaniards. Their chief wars were those of 1598, and 1665, the latter of which ended 10 years afterward, in a formal treaty of peace. In 1770, an attempt of *Gonzago* to collect the Araucanians in towns, led to another war; by which it was conceded that the natives should have a resident minister or representative, at Santiago. The *Revolution* in Chili, commenced in 1810, but was repressed by the Spanish forces from Peru, till 1817; when, by the aid of General San Martin, with troops from Buenos Ayres, the victories of *Chacabuco* and *Maypu*, secured the independence of Chili. *Don Bernardo O'Higgins*, was elected its first president; but was compelled to resign, in 1823. General *Prieto* is now the president of Chili.

La Plata, or the *Argentine Republic*, was first colonized by *Mendoza*, in 1535; and the city of Buenos Ayres was founded by him in the same year. It was dependent on Peru, till 1778; when it was erected into the *viceroyalty of Buenos Ayres*, or *La Plata*; and allowed to trade directly with several ports of Spain. In 1806, it was attacked, and the city taken by the British; but they were soon expelled, by the aid of *Liniers*, a French officer. In 1810, the first insurrection against the mother country broke out in Buenos

Ayres; and *Liniers* was declared viceroy; but deposed soon afterward. In 1811, a Congress was assembled, which, in 1814, appointed *Pozadas* Supreme Director of the republic, with an executive council. In 1816, a Congress met at Tucuman, appointed *Pueyrredon* director, and declared the independence of the United Provinces; which was recognized by the United States, in 1822. The name was changed, in 1826, to the *Argentine Republic;* and *Rivadavia* was chosen president. A war with Brazil, on account of the Banda Oriental, led to a civil war, which resulted, in 1830, in the elevation of General *Quiroga* as dictator or governor; though his power was chiefly confined to the province of Buenos Ayres. General *de Rosas* is now governor of that province, and charged with the foreign relations of the *Argentine Republic:* but the other provinces are in fact independent.

Paraguay, was granted to the Jesuits, in the beginning of the 17th century; and was entirely under their control, till they were defeated by the united Spanish and Portuguese armies, in 1756. Paraguay was included, in 1778, in the viceroyalty of La Plata; and so continued, till the Revolution. In 1813, Paraguay was proclaimed an independent republic, under two consuls, *Yegros* and Dr. *Francia.* At the end of the year, Dr. Francia caused himself to be named *dictator* for three years, and at the end of that term, for life. In 1826, he made a formal declaration of the independence of Paraguay; of which he continued the dictator, or sovereign, until his death in 1840.

Uruguay, formerly called the *Banda Oriental*, was originally settled by a Spanish colony from Buenos Ayres; but soon became a subject of contention between Spain and Portugal; though retained by the former. This province took part with Buenos Ayres, in effecting the Revolution: but separating itself from that state, in 1815, under General *Artigas*, it was invaded and held in subjection by Brazil, until 1826; when General *Rivera*, aided by Buenos Ayres, raised the standard of independence. By the peace of Rio Janeiro, in 1828, the Banda Oriental became a separate republic, under the name of *Monte Video*, which it afterwards changed to the *Oriental Republic of Uraguay;* of which General *Rivera* (or Ribeira) is now president.

VII. DEPARTMENT:

BIOGRAPHY.

In the department of Biography, we comprehend that portion of human knowledge which relates to the lives of distinguished persons; their character and actions; their descent and their insignia; including the kindred and subordinate subjects of Genealogy, Heraldry, Autographics, and Sphragistics. The name is derived from the Greek, βιος, life, and γραφω, I write or describe: and we may add, that Biography is to individuals, what Chronography is to communities, or nations; the record of their existence. These departments are, therefore, closely connected, and the present one is often regarded as subordinate to the preceding; but we think it so extensive, and important, as to deserve a distinct place. Judging from the Catalogues of some of our largest Libraries, about one-fifth part of all the books in the world, relates to History and Biography: from which fact the propriety of separating these subjects will perhaps be still more apparent.

Biography, may, we think, be considered as supplementary to Civil History, rather than subordinate, to it. Where the historian gives only a crowded sketch, the biographer selects a single prominent object, and presents us with a finished picture. This department presents advantages over every other, for mingling instruction with amusement, in a simple and natural style: the gravest facts and principles being often enlivened by sprightly anecdotes; and the current of action readily bearing the reader along to the close, without any severe mental effort. It is doubtless the duty, as it is generally the aim of the Biographer, to exhibit the faults of his subject as a warning, and the virtues as an example, for the reader's benefit; but this is often better done indirectly, than in a formal manner. While a proper freedom of description is allowable, there are also domestic privacies, especially in regard to persons recently deceased, which we think no biographer has a right to invade. If wrong conduct, or erroneous principles are already known to the world, they must perhaps be mentioned; but it is the writer's fault if they are allowed either to gratify or to mislead the mind of the reader.

The earliest Biographers, in most countries, were the *bards*, or *minstrels*, who sang the exploits of their chiefs, exalted them as demigods, and ascribed to them actions surpassing human ability. Thus, the remains of the most ancient biography, even in Greece and Rome, are mixed with their Mythology; or, in other words, involved in fable. It is remarkable that in this department of Literature, the Greeks were surpassed by the Romans: the earliest general work on Biography being that of *Varro*, written about 50 B. C., and said to have contained notices of seven hundred distinguished men; though unfortunately it is now lost. *Cornelius Nepos*, in his Lives of Excellent Commanders, about 30 B. C., has given, in a classical style, the biography of twenty-two celebrated generals, mostly Grecian. *Suetonius*, about A. D. 100, wrote the Lives of the Twelve Cæsars; and notices of Illustrious Grammarians, Rhetoricians, and Poets; which works are yet extant. *Plutarch*, who died about A. D. 130, was the first and only Greek writer of note, on general Biography; and his Parallel Lives of celebrated Greeks and Romans, gave to this study a more philosophical form, and raised it to a higher estimation, than it had previously attained.

The name *Autobiography*, is applied to those works in which the writer gives an account of his own life. If written with fidelity, they are often of great value; being usually more full and explanatory than more formal works. The name of *Memoirs*, is applied to mixed works of history and biography, written at the time of the events described, or soon after; usually by persons who witnessed the events, or took part therein. Such works are generally minute and sprightly; often valuable, but not always worthy of entire confidence. The term *Necrology*, has been applied to a brief biography, or obituary notice of persons recently deceased. Such productions are often partial, and almost necessarily incomplete; but as rapid sketches, demanded by the public curiosity, they often possess the deepest interest. The term *Eulogy*, is often applied to a funeral discourse, in honor of some distinguished person.

The subject of *Genealogy*, is a constituent part of Biography; tracing, as it does, the ancestry or the progeny of individuals, and the relationship of families. It is a subject of legal importance, in regard to the descent or disposition of property; as already alluded to in a previous department. (p. 119). It is also frequently important in history, as regulating the descent of crowns, fiefs, and titles of nobility; and occasionally furnishing the cause of wars, quarrels, alliances, and other events. A series of persons descended from a common ancestor, is called a genealogical *line;* and tables are often constructed, in the form of a *tree*, or otherwise, for the purpose of exhibiting family genealogies. These were most highly prized in the middle ages; when noble descent was most highly regarded; and when the wealth and power of the nobles gave the greatest value to their titles and claims. In many cases also, important offices, not hereditary, were accessible only to those who could prove a sufficient line of noble ancestors. Happy is it for our own country, that we have abrogated the aristocratical system of Europe; though family influence, and the influence of wealth and fashion, are still strongly, and often too strongly felt. The use of family names, or *surnames*, though occasional in remote times, was not generally introduced in Europe, till about A. D. 1200: and the earliest recorded instance in Germany, is that of *Henry de Sinna*, in 1062.

Heraldry, is that study, or science, which relates to badges of honor, or personal insignia, called *coats of arms*. In a wider sense, it relates also to the management of public ceremonials; as processions, cavalcades, tournaments, coronations, and the like. The name is derived from the French *héraut*, a *herald*, or marshal, whose business it is to establish armorial bearings, settle disputes for precedence, and regulate public ceremonials. The objects of this study, are, to explain the distinctive insignia of persons of rank; to assist in tracing genealogies; and to stimulate those of noble birth to deeds of patriotism, and virtue. Though of little use, therefore, in our own country, still we think it proper here to give some general ideas of a subject which has absorbed so much time, and excited so much interest, in the eastern world.

A *coat of arms*, *armory*, or *achievement*, is a badge of honor, usually painted, or engraved, on carriages, weapons, seals, plate and the like, to identify or dignify its possessor. Thus, in the days of chivalry, when the warrior covered his face with his visor, the device on his shield, and the crest on his helmet, served to distinguish him from his companions. These devices were afterwards transmitted to his descendants; varied only by family alliances, and governed by rules so exact as to have dignified Heraldry with the name of a science, alike distinct and complicated. Arms may belong to individuals, to families, or to nations; and they are sometimes distinguished by different names, to denote the cause of their being borne; as arms of dominion, of pretension, of concession, of community, of patronage, of family, of alliance, of succession, of assumption, and the like. European money is often stamped with the arms of the sovereign under whom it was coined.

Something like these insignia, was used in very remote times, to distinguish individuals or nations. Thus the Israelites chose the Hebrew letter *Tau;* the Scythians, a *thunderbolt;* the Egyptians, an *ox;* the Phrygians, a *hog;* the Thracians, *Mars;* the Medians and Romans, an *eagle;* the Persians, a *bow and arrow;* and the Goths, a *bear*. But Heraldry appears to have been first made a regular study, by the Germans, in the days of the Crusades, and of Chivalry: and its French name, *Blason*, comes from the German, *blasen*, to blow the horn; as was done when the herald announced a new knight, and his coat of arms. To *blazon* a coat of arms, is to explain or describe its emblems; and to *marshal* the same, is to compose a new coat of arms, or to unite two or more in one, as in the union of families or nations. The French had cultivated this study, before it was introduced into England, by the Norman conquerors; and hence most of its technical terms are in the French language.

The principal part of a coat of arms is the *escutcheon*, or *shield*, with its tinctures, ordinaries, and charges. The shield has varied in shape, with different ages and nations; but is generally widest at the top, and pointed at the bottom; though among the Italians it is oval; and, for women, the escutcheon is lozenge or diamond shaped. There are nine *points* on the escutcheon or shield, which have received distinctive names. They are the *dexter chief*, *middle chief*, and *sinister chief*, near the top; the *honor point*, *fess* or *heart point*, and *nombril point*, down the middle; and the *dexter base*, *middle base*, and *sinister base*, near the bottom. The dexter chief and dexter base, are on the right side of the shield; that is, on the left of an observer looking toward it; but the sinister chief and base are on the left side of the shield. (Plate VI. Fig. 5.)

The *tinctures*, or armorial colors, are represented in engravings as follows; *or*, (golden or yellow), by a dotted surface; *argent*, (silver or white), by a white surface, unshaded; (Fig. 7); *azure*, (blue), by shading with horizontal lines; (Fig. 8); *gules*, (red), by shading with vertical lines; (Fig. 9); *sable*, (black), by two sets of lines, horizontal and vertical: (Fig. 10); *vert*, (green), by lines inclining downwards to the right; (Fig. 12); *purpure*, (purple), by lines inclining downwards to the left; (Fig. 16); *tenne*, (orange), by lines crossing obliquely; (Fig. 15); and *sanguine*, (dusky red), by oblique lines inclining downwards to the left, crossed by horizontal ones. (Fig. 14). Of furs, *ermine*, is represented by black sprigs on a white field, each sprig having three dots over it; (Fig. 6); and *contre-ermine*, (or counter-ermine) is the same, only with white sprigs, on a black ground. *Vair*, is represented by a surface covered with small escutcheons, alternately white and blue, with the white inverted, and placed opposite to the blue; (Fig. 11); while in *contre-vair*, two of the same color, blue or white, are placed head to head.*

The *ordinaries*, are certain divisions or portions of the escutcheon, which have received distinctive names. Thus, a broad horizontal space, constituting the upper third part of the shield, is called the *chief;* (Plate VI. Fig. 6); and a broad horizontal belt across the middle, is called a *fess;* (Fig. 7); or if narrower, a *bar*. A broad space down the middle of the shield, is termed the *pale;* (Fig. 8); a similar belt from the left upper corner, downward to the right, is called the *bend;* (Fig. 9); and if inclined the contrary way, the *bend sinister*. The *bar sinister*, (Fig. 10), is the most common badge of illegitimacy. A smaller shield within the escutcheon, is called an *inescutcheon;* and a broad space around the edge, is termed a *border*. (Fig. 11). A horizontal and vertical band, together, form a *cross;* but two oblique bands, united, form a *saltier*. (Fig. 12). A band across the shield, forming a right angle, with the vertex upwards, is called a *chevron;* (Fig. 13); a vertical triangle, with the point upwards, is named a *pile;* (Fig. 14); and a vertical band, narrowest in the middle, and with concave sides, is termed a *flasque*. (Fig. 15). A cross in the form of the letter T, that is, wanting the upper arm, is called a *potence*. (Fig. 16). If the shield is divided by a line across the middle, it is said to be *parted per fess*, (parté per fesse); if by a line down the middle, *parted per pale;* and so of other directions. The dividing line may be either straight; or indented, (Fig. 6); or invected, (Fig. 7); or engrailed, (Fig. 8); or waved, (Fig. 9); or nebuled, (Fig. 12); or it may be embattled, raguled, urded, dovetailed, or in still other forms, which we have no room here to explain.

Heraldic *charges*, are those figures which are painted within the field of the escutcheon; and which may represent almost any objects, whether natural or artificial. If simple round spots, or *roundlets*, are used, they are called *bezants*, when yellow; *plates*, when white; *torteaux*, when red; and by other names for other

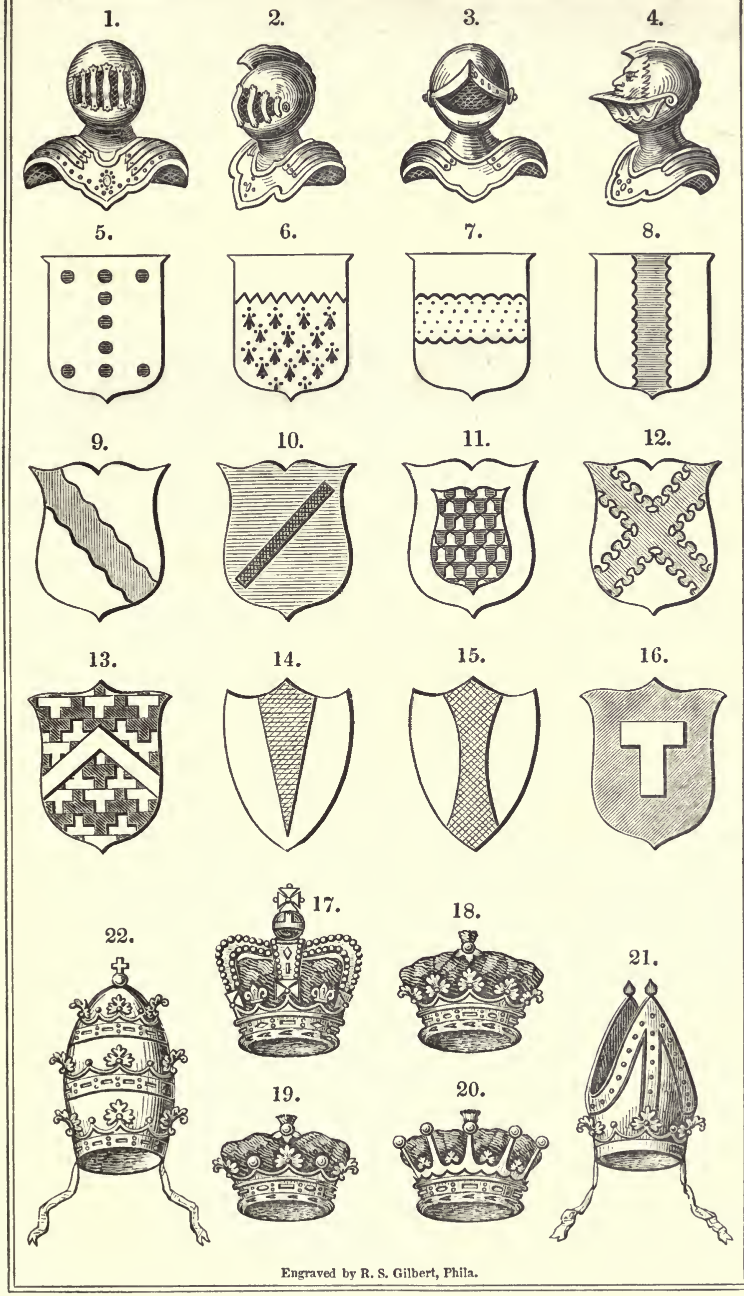
* The block shading in Fig. 13, is technically called *potent-counter-potent;* but it might be more simply designated *counter-potent*.

colors; or, if very small, they are called *guttes*, that is, drops. If diamond shaped, they are called *lozenges*, *fusils*, or *mascles;* and if oblong, they are named *billets*. Angels, men, beasts, birds, fishes, insects, stars, and ships, are frequently used as heraldric charges; having in the first instance probably a symbolical reference to the acts or character of their bearer. In case of animals, their position is carefully designated; as *couchant*, lying down; *dormant*, sleeping; *guardant*, looking towards the spectator; *reguardant*, looking backward; *passant*, walking by; *combattant*, fighting; *rampant*, rearing up to fight; *salient*, leaping; *seiant*, sitting; and various other postures.

Some charges are deemed more honorable than others: as the lion is deemed the most honorable of beasts; and beasts generally are deemed more honorable than fishes: but these very artificial distinctions, now but little regarded, it is not our province to explain. *Marks of cadency*, are those symbols used to designate the order of birth or primogeniture. Thus, the eldest son may bear the addition of a *label*, or *alabel;* that is a horizontal bar, with three drops beneath: the second son may be distinguished by a *crescent;* the third, by a *mullet*, or five pointed star; the fourth, by a *martlet*, a certain small bird; the fifth, by an *annulet*, or ring; the sixth, by a *fleur de lis;* and so on. Sometimes, however, this distinction is made by repeating the characteristic charge, or varying its position.

The *ornaments*, of an escutcheon, are the external objects connected with it; as crests, helmets, scrolls, and the like. The *crest*, was originally the plume attached to the helmet; and in coats of arms it was a badge of the highest honor: but the term is now applied to any object placed above the shield, for ornament. Of the *helmet*, there were four kinds; for the king; (Fig. 1); for the nobility; (Fig. 2); for a knight; (Fig. 3); and for an esquire. (Fig. 4). *Crowns*, are appropriated to sovereigns; (Fig. 17); and *coronets*, to the nobility, with distinctions to mark the grade. The coronets of dukes, marquises, and earls, (Figs. 18, 19, 20), are set with both strawberry leaves and pearls; but those of viscounts and barons, are set with pearls alone. *Mitres* are peculiar to the coats of arms of the higher clergy; (Fig. 21); but the *tiara*, or triple crown, (Fig. 22), is worn only by the pope of Rome. The *mantling*, is the drapery thrown around the escutcheon: the *wreath*, resembling leaves, is an appendage to the helmet; the *scroll*, is usually attached below the escutcheon, containing some motto selected by the individual owner; and the *supporters*, are figures, usually of animals, standing on the scroll, and on each side of the escutcheon.

The *marshalling of arms*, or uniting of two or more coats in one, is most frequently performed by *impaling;* that is, bisecting the shield by a vertical line, and appropriating one-half to each coat. This method is usually adopted for the escutcheons of a husband and wife. Another mode, is by *quartering;* that is, dividing the shield, by cross lines, into quarters, in which the separate arms are placed. These may be farther subdivided; so that one coat of arms may unite many others, from which it is derived. Funeral escutcheons or achievements, also called *hatchments*, are of a lozenge shape, and



Engraved by R. S. Gilbert, Phila.

are affixed to the fronts of houses, on the death of their proprietor, to denote his rank and condition. On the death of a husband, for example, that side of the lozenge which is appropriated to his distinctive arms, is painted black, while the wife's side remains white. The above, we trust, will suffice to give a general idea of the principles of Heraldry.

The term *Autographics*, may be applied to the study of the handwriting of individuals, with a view to its recognition. The signature of any person is commonly called his *autograph;* but this name is also applied to manuscripts of whatever length, when they are in the handwriting of their author. Extensive collections of autographs have been made; which, in identifying manuscripts, or signatures, are of historical, as well as biographical importance. Of similar use is the study of *Sphragistics*, or the examination of seals, with their devices and inscriptions. This study has been termed a branch of Diplomatics; as serving to authenticate treaties, and other documents: but we think it also especially subsidiary to Biography. *Seals*, are of various shapes, though usually in that of a shield, whether cardiform or oval; and they were formerly impressed on gold, silver, lead, or common wax, until the introduction of *sealing wax*, in the sixteenth century. Originally, none but persons of rank, or churches, or corporations, and states, had a right to use seals; and the color of the wax indicated their relative dignity. The earliest regular work on Sphragistics, was that of *Heineccius*, on seals, published in 1709.

In comparing distinguished individuals with each other, it seems most natural and proper to institute the comparison between those of similar characters, or pursuits. Thus, we may naturally compare Cæsar and Bonaparte; or Des Cartes and La Place: but a comparison between Alexander and Aristotle, or between Newton and Shakspeare, would be futile, if not absurd. In such cases, it is enough to know that each was preëminent, in his own sphere. This principle will be our guide, in the subordinate arrangement of this department; in which the only philosophical method that occurs to us, is to group together individuals of the same country, and of similar pursuits; as statesmen, warriors, divines, and other classes of men. The subject of Biography is of course inexhaustible; so that even the largest works are found to commemorate but an extremely small portion of our race; and this in reference only to their most prominent actions and traits of character. We have thought that the small space here allotted, would be best devoted to a systematic arrangement of the most prominent names; preparatory to the perusal of extensive and miscellaneous Biographical works.

We proceed therefore to treat of the present department, in geographical, and ethnographical order, under the four branches of Euclassic, Oriental, European, and American Biography.

CHAPTER I.

EUCLASSIC BIOGRAPHY.

In the branch of Euclassic Biography, we include the lives of all the distinguished persons of antiquity, who were known to the ancient Greeks and Romans. It extends therefore to the Jews, Egyptians, Assyrians, and Persians, who flourished before or during the Roman conquest and dominion; as well as to the Greeks and Romans themselves. Of the name *Euclassic*, we have already spoken, in the preceding department. (p. 201). Euclassic Biography is necessarily very imperfectly known to us; owing to the remoteness of the period, and the scantiness of the records, which have been preserved, in any form, to the present day Enough however remains to prove that human nature was essentially the same, in ancient times, as in our own; though influenced then by a less perfect system of society, laws, and religion. The want of greater personal security, and the comparative instability of states and governments in those times, tended perhaps to produce more self-dependence, and more originality of character, than is common at the present day; though to this remark we have frequent exceptions, especially in cases of great emergencies. The spirit of the ancient heroes is now unemployed, or otherwise occupied; but by no means extinct.

§ 1. Of *Jewish Biography*, our principal records are the Bible, and the writings of Josephus. The following is the series of *Antediluvian Patriarchs*, with the dates of their birth and death, according to the common chronology. *Adam*, 4004—3074 B. C.; *Seth*, (or Sheth), 3874—2962; *Enos*, (or Enoch), 3769—2864; *Cainan*, (or Kenan), 3679—2769; *Mahalaleel*, (or Malaleel), 3609—2714; *Jared*, (or Jered), 3544—2582; *Enoch*, (or Henoch), born 3382, translated to heaven 3017; *Methuselah*, (or Mathusela), 3317—2348; *Lamech*, 3130—2353; and *Noah*, (or Noe), 2948—1998 B. C. Of Noah's three sons we have already spoken; (p. 201); and we have farther room to continue the genealogy only down to Jacob, as follows: *Shem*, (or Sem), 2446—1846 B. C.; *Arphaxad*, 2346—1908;* *Salah*, (or Shelah), 2311—1878; *Eber*, (or Heber), 2281—1817; *Peleg*, (or Phalec), 2247—2008; *Reu*, (or Ragau), 2217—1978; *Serug*, (or Saruch), 2185—1955; *Nahor*, (or Nachor), 2155—2007; *Terah*, (or Tharah), 2126—1922; *Abraham*, 1996—1821; *Isaac*, 1896—1716; and *Jacob*, 1836—1689 B. C.

The twelve sons of Jacob, heads of the twelve tribes of *Israel*, we have already named; (p. 140): and will only add that *Joseph* died 1635 B. C., aged 110 years. From *Levi*, through *Kohath* and *Amram*, was descended *Moses*, the leader of the Israelites, and their divinely appointed lawgiver and historian. *Moses* died 1452 B. C., or, according to Hales, 1609 B. C.; and his brother *Aaron*, the first Jewish high-priest, died in the same year. *Joshua*, the successor of

* The Septuagint mentions *Cainan* as next after Arphaxad; but in the Hebrew text his name is omitted.

Moses, died 1426 B. C.; and was succeeded by the Judges, *Othniel*, *Ehud*, and *Shamgar*, to 1312 B. C.; *Deborah*, the prophetess, and *Barak*, who defeated the Canaanites, about 1290 B. C.; *Gideon*, (surnamed Jerubbaal), who defeated the Midianites, 1245 B. C., and whose son, Abimelech, made himself a king; *Tola* and *Jair; Jephthah*, who defeated the Ammonites, 1188 B. C.; *Ibzan*, *Elon*, and *Abdon; Samson*, who died amid the Philistines, 1117 B. C.; *Eli;* and lastly, *Samuel*, the prophet, by whom *Saul* was anointed king, 1095 B. C. Saul was slain 1055; *David* died 1015; and *Solomon* died 975 B. C. (See p. 202).

After the division of the kingdom, the kings of *Israel*, with the dates of their accession, were *Jeroboam* I., 975 B. C.; *Nadab*, 954; *Baasha*, (or Baasa), 953; *Elah*, (or Ela), 930; *Zimri*, 929; *Ahab*, 918; *Ahaziah*, 897; *Joram*, (or Jehoram), 896; *Jehu*, 884; *Jehoahaz*, 856; *Joash*, 839; *Jeroboam* II., 825; *Zechariah*, 771; *Menahem*, 770; *Pekahiah*, (or Pekaiah), 760; *Pekah*, 758; and *Hosea*, (or Hoshea), 729 B. C.; with whom the kingdom of Israel became extinct. The contemporary kings of *Judah* and the dates of their accession, were, *Rehoboam*, 975 B. C.; *Abijah*, (or Abia), 958: *Asa*, the pious, 955; *Jehosaphat*, the wise, 914; *Jehoram*, (or Joram), 889; *Ahaziah*, 885; *Athaliah*, the usurper, 884; *Joash*, (or Jehoash), 878; *Amaziah*, 838; *Uzziah*, (or Azariah), the virtuous, 809; *Jotham*, 757; *Ahaz*, the idolater, 741; *Hezekiah*, the pious, 726; *Manasseh*, the cruel, 697; *Amon*, 642; *Josiah*, the good, 640; *Jehoahaz*, (or Shallum), and *Jehoiakim*, both 608; and *Zedekiah*, 597 B. C., the last of whom was carried a captive to Babylon.

Of the Jewish *prophets;* besides *Samuel*, and *Nathan*, 1055 B. C.; and *Elijah* and *Elisha*, 896 B. C.; the four *greater*, so called, were *Isaiah*, the evangelical, who flourished 750; *Jeremiah*, the warning and weeping, about 629; *Ezekiel*, the speculative and mysterious, 595; and *Daniel*, the historical, who flourished 569 B. C. The twelve lesser prophets, with the dates at which they flourished, were *Jonah*, 830 B. C.; *Amos*, 820; *Hosea*, 750; *Micah*, 740; *Nahum*, probably 735; *Joel*, probably 680; *Zephaniah*, 630; *Habakkuk*, 610; *Obadiah*, probably 600; *Haggai*, 520; *Zechariah*, 520; and *Malachi*, about 420 B. C. The leaders in rebuilding the Temple, were *Zerubbabel*, the governor, and *Joshua*, the priest, 535 B. C. *Ezra*, the priest, 467 B. C., restored the temple worship; and *Nehemiah*, 455 B. C., rebuilt the walls of Jerusalem. The succession of high-priests, thenceforward till the destruction of Jerusalem, we have no room to present.

Sadoc, founder of the sect of Sadducees, flourished about 250 B. C.; and *Hillel*, founder of the sect of Pharisees, about 200 B. C. The Targum writers, *Jonathan* and *Onkelos*, we have already mentioned. (p. 144). *Philo* of Alexandria, called the Platonist, or follower of Plato, flourished A. D. 40; and *Josephus*, the Jewish historian, died at Rome, about A. D. 80. The biography of distinguished modern Jews, as Spinoza, Menasseh, Mendelssohn, and others, belongs, we think, to the countries in which they resided.

§ 2. Of early *Egyptian Biography*, very little is known; for reasons already explained in the preceding department. The fabulous personage, *Thaut*, to whom so many inventions have been attributed, (p. 26), is said to have gone from Babylon to Egypt, in the earliest times of the latter, and to have been contemporary with *Osiris* and *Isis*. The earliest Egyptian legislator, appears to have been *Menes;* the founder of Memphis. *Tnephactus*, *Bocchoris*, and *Asychis*, also named as law-givers, probably flourished about 800 B. C. The Egyptian kings of the Ptolemæan dynasty, with the dates of their accession, were *Ptolemy* I., (Lagus or Soter), 323 B. C.; *Ptolemy* II., (Philadelphus), 284; *Ptolemy* III., (Euergetes), 246; *Ptolemy* IV., (Philopater), 221; *Ptolemy* V., (Epiphanes), 204; *Ptolemy* VI., (Philometor), 180; *Ptolemy* VII., (Physcon or Euergetes II.), 145; *Ptolemy* VIII., (Lathyrus), and his mother Cleopatra I., 116, including the reign of his brother, Ptolemy Alexander; *Ptolemy Alexander* II., 81, with Cleopatra II., and Berenice; *Ptolemy Alexander* III., 80; *Ptolemy Dionysius*, (Auletes), 65; and *Ptolemy Dionysius* II., 51, with *Cleopatra* III., who destroyed herself, 31 B. C. The Greek philosophers at Alexandria, during this and a later period, will be mentioned under Grecian Biography. *Manetho*, the Egyptian historian, flourished about 280 B. C.

Of Assyrian, Babylonian, and Persian Biography, very little information has been preserved. (p. 204). The kings of the last Babylonian empire, with the dates of their accession, were, *Nabopolassar*, who revolted from the Assyrian government, 626 B. C.; *Nebuchadnezzar*, the Great, (Nabuchodonosor II.), 606; *Evil Merodach*, 562; *Neriglissar*, (or Belshazzar), 558; and *Nabonadius*, (or Labynitus), the Belshazzar of the Scriptures; who came to the throne 553, but was slain 538 B. C. The kings of Persia, after Xerxes, (p. 205), were *Artaxerxes*, (Longimanus), 464 B. C; *Xerxes* II., 425; *Darius Nothus*, (or Ochus), 423; *Artaxerxes* II., (Mnemon), 404; *Artaxerxes* III., (or Ochus), 358; *Arses*, or Arogus, 357; and *Darius Codomanus*, 335 B. C.; who fell in the conquest of Persia by Alexander the Great. We have farther room to mention only *Berosus*, the Babylonian historian, who flourished about 250 B. C.; and *Zoroaster*, (or Zerdusht), the Persian philosopher, who lived about 500 B. C.

Among the Syrian kings, (p. 205), with the dates of their accession, were *Seleucus Nicator*, 312 B. C.; *Antiochus* I., (Soter), 280 B. C.; *Antiochus* II., (Theos), 261; *Seleucus* II., (Callinicus), 246; *Seleucus* III., (Ceraunus), 226; *Antiochus* III. the Great, 223; *Seleucus* IV., (Philopater), 187; *Antiochus* IV., 175; *Antiochus* V., 164; *Demetrius* I., (Soter), 162; *Alexander Balas*, 150; *Demetrius* II., (Nicator), 146; *Antiochus* VI., 144; *Diodotus*, 143; *Antiochus* VII., 139; *Demetrius* II., restored, 130; *Alexander Zebina*, 127; *Antiochus* VIII., 123; *Philip and Demetrius*, 93; *Tigranes* of Armenia, 83; and *Antiochus Asiaticus*, 69 B. C., who was dethroned by Pompey the Great. *Sanchoniathon*, the Phœnician historian, probably flourished about 1200 B. C.; and *Cadmus*, the Phœnician, who carried letters into Greece, flourished 1490 B. C.

§ 3. We come next to the interesting subject of *Grecian Biography;* in which we shall first speak of statesmen, warriors, and orators;

next of historians and poets; and lastly of philosophers and men of science. The heroes of the Trojan war, *Achilles*, *Ulysses*, *Agamemnon*, and others, are chiefly celebrated by Homer, and belong to the age of tradition. Of Grecian lawgivers, *Lycurgus*, 884, and *Solon*, 594 B. C., have been already mentioned. The aspiring *Pisistratus*, died about 527 B. C.; and his sons Hipparchus and Hippias, were expelled from the government of Athens. The principal generals of Greece in the Persian wars, were *Miltiades*, who died about 489 B. C.; *Leonidas*, of Sparta, who fell 480 B. C.; *Aristides*, called the Just, who died about 467; *Themistocles*, who died 449; *Pausanias*, who died 471; and *Cimon*, the son of *Miltiades*, who died 449 B. C. *Pericles*, the Athenian leader, died of the plague, 429 B. C.; *Alcibiades*, of Athens, was slain 404; *Conon*, of Athens, died 393; and *Lysander*, of Sparta, the victor in the Peloponnesian war, fell in the Theban war, 394 B. C. *Pelopidas*, of Thebes, fell in battle, 364; and *Epaminondas*, who defended Thebes against Sparta, also fell gloriously, 363 B. C. *Agesilaus*, of Sparta, died 306 B.C.; and *Phocion*, the virtuous statesman of Athens, was put to death, 318 B. C. We have further room to mention only *Philopœmen*, general of the Achæan league, who was put to death, 183 B. C., and has been styled the last of the Greeks. Of the Grecian orators, *Lysias* died 379; and *Isocrates*, 338 B. C.: *Demosthenes*, the Athenian statesman and orator, died 322; and *Æschines*, his rival, 323 B. C.

Of the Greek historians, *Herodotus*, of Halicarnassus, flourished 445; *Thucydides*, died at Athens, 391; *Xenophon*, celebrated also as a general, died 359; *Polybius*, also a statesman and general, died about 124; *Diodorus Siculus*, (or the Sicilian), flourished 44; and *Dionysius of Halicarnassus*, flourished 30 years B. C. Of *Plutarch*, the biographer, we have already spoken. (p. 243). Charon of Lampsacus, who flourished 460, and Ctesias of Cnidos, 400 B. C., are among the historians of minor note.......Of the Greek poets, *Homer* flourished about 907 B. C.; and *Hesiod*, probably at the same time. *Sappho*, of Lesbos, flourished 600; and *Anacreon*, of Teos, about 530 B. C. *Æschylus*, of Athens, died 456; *Pindar*, of Thebes, 435; *Euripides*, of Salamis, 407; and *Sophocles*, of Athens, died 406 B. C. *Bion*, of Smyrna, died about 300; *Theocritus*, of Syracuse, in Sicily, flourished 285; and *Moschus*, of Syracuse, probably flourished 160 B. C. *Æsop*, the fabulist, born in Phrygia, died 561 B.C. Archilochus, Tyrtæus, Theognis, Empedocles, Aristophanes, Menander, and others, we have only room to name.

The Seven Wise Men of Greece, were *Solon*, of Athens, (p. 207); *Thales*, of Miletus, (p. 20); *Periander*, of Corinth, who died 585 B. C.; *Chilo*, of Sparta, who died 597 B. C.; *Pittacus*, of Mytilene, who died 570 B. C.; *Cleobulus*, of Lindos, who died 564 B. C.; and *Bias*, of Priene, who flourished at the same date. Of other Greek philosophers, besides those already mentioned as founders of sects, (p. 20, 21), we would name *Anaximander*, the pupil and friend of Thales, who died 547 B.C.; *Zeno*, the elder, of Elia, a disciple of Xenophanes, who flourished 464; and *Leucippus*, of Elea, who flourished 440 B.C.; *Anaxagoras*, of Clazomene, who was the preceptor of Pericles, and died 428 B. C.; *Heraclitus*, the weeping philosopher, who flourished 500; and *Democritus*, the mirthful, who died 361 B. C.; *Xenocrates*, the virtuous, who died 314; and *Theophrastus*, the eloquent, who died 286 B.C. *Longinus*, the critic and statesman, under Queen Zenobia, of Palmyra, died A.D. 273.

Of the Greek *scientes*, or scientific men, besides those termed philosophers, *Meton* of Athens, the astronomer, flourished 432; *Eudoxus*, the astronomer and geometer, died 352; *Euclid* of Alexandria, the geometer, flourished 300; and *Archimedes* of Syracuse, the geometer and mechanician, was killed 212 B. C. *Eratosthenes*, the geographer and librarian, of Alexandria, died 194; *Hipparchus* of Nicæa, the astronomer, died 125 B. C.; *Strabo* of Amasia, the geographer, died A. D. 25; and *Ptolemy* of Alexandria, the astronomer, flourished about A. D. 100. *Ctesibius* of Alexandria, the mechanician, flourished 135; and *Hero*, of the same place and pursuit, flourished 120 B. C. *Hippocrates* of Cos, the great physician, died 361; and *Galen* of Pergamus, alike renowned in medicine, died 201 B. C. Of Grecian artists, *Phidias*, the sculptor, died 432 B. C.; *Parrhasius*, the painter, and *Zeuxis*, his rival, flourished about 400; *Apelles*, the painter, flourished about 330; and *Praxiteles*, the sculptor, about 324 B. C.

§ 4. The subject of *Roman Biography*, is alike extensive and interesting. Of the seven *kings* of Rome, *Romulus*, its founder, is said to have died 715 B. C.; *Numa Pompilius*, the pious, died 672; *Tullus Hostilius*, the warlike, was killed 640; *Ancus Martius*, the prudent, died 616; *Tarquinius Priscus*, (the elder Tarquin), was assassinated, 578; and *Servius Tullus*, the freedman, met the same fate, 534 B. C.; but *Tarquinius Superbus*, or the proud, died about 14 years after his expulsion. (p. 208). Of the *consuls*, who succeeded in the Roman government, there were no fewer than four or five hundred, besides occasional *dictators*, on great emergencies. *Junius Brutus*, one of the first two consuls, fell in battle, in the year of his election, 509 B. C.: *Collatinus*, his colleague, being of the Tarquin family, retired from Rome; and *Publius Valerius*, styled Poplicola, was chosen in his stead; while *Spurius Lucretius*, succeeded Brutus; all in the same year. *Florus Lartius*, the first dictator, 498 B. C., was previously a consul. *Menenius Agrippa*, appeased the people at Mount Sacer, in the same year. *Marcius Coriolanus*, who was exiled, and went over to the Volsci, but afterwards saved Rome, died 488 B. C. *M. R. Fabius*, five times consul, twice dictator, and seven times triumphant, probably fell in battle with the other Fabii, 477 B. C. *L. Q. Cincinnatus*, thrice dictator, returned each time victorious to his plough, and died 430 B. C. *L. F. Camillus*, who, as dictator, saved Rome from the Gauls, died 365 B. C. *C. L. Fabricius*, the magnanimous conqueror of Pyrrhus, died about 270 B. C.

M. A. Regulus, the invader, and afterwards the captive of Carthage, was there put to death 251 B. C. *Q. M. Fabius*, called Cunctator, or the delayer, because, when dictator, he avoided a battle with Hannibal, was twice triumphant, and died 202 B. C. *M. C. Marcellus*, victorious at Syracuse, was killed 208 B. C. *P. C.*

Scipio, the first surnamed Africanus, victorious at Zama, died about 184 B. C.; *L. C. Scipio*, surnamed Asiaticus, was his brother; and *P. Æmilius Scipio*, styled Africanus the younger, died 128 B. C. *M. P. Cato*, the censor, died 147 B. C.; and *L. Mummius*, surnamed Achaicus, who completed the conquest of Greece, flourished at the same date. *Caius Gracchus*, the seditious agrarian, was killed 121 B. C.; thirteen years after his brother Tiberius. *Q. C. Metellus*, surnamed Numidicus, who warred against Jugurtha, flourished 109 B. C. *C. Marius*, the victor and tyrant, died 86 B. C.; *Cinna*, his adherent, was previously slain; and *L. C. Sylla*, his rival, alike cruel, died 78 B. C. *Cneus Pompeius*, or Pompey the Great, the friend of Sylla, and rival of Cæsar, was slain in Egypt, 48 B. C. *M. T. Cicero*, the orator, and friend of Pompey, was killed 43 B. C.; and *M. Cato*, surnamed Uticensis, sacrificed himself at Utica, 46 B. C. *Julius Cæsar*, was slain at Rome, 44 B. C.; *M. J. Brutus*, and *C. Cassius*, who took part in slaying him, fell at Philippi, 42 B. C.; and *M. Antonius*, or Mark Anthony, their vanquisher, sacrificed himself for Cleopatra, 31 B. C.; when Rome ceased to be a republic, even in name.

Julius Cæsar, and Augustus, were included among the *Twelve Cæsars*, so called; of whom the other ten, with the dates of their accession, were *Tiberius*, A. D. 14; *Caligula*, the vile, A. D. 37; *Claudius*, the first of that name, 41; *Nero*, the cruel, 54; *Galba*, the weak, 68; *Otho* and *Vitellius*, each a few months in 69; *Vespasian*, the popular, 69; *Titus*, the virtuous, 79; and *Domitian*, the cruel, A. D. 81. Next succeeded the five good emperors, *Nerva*, the aged and prudent, 96; *Trajan*, the popular, 98; *Adrian*, the enterprizing, 117; *Antoninus Pius*, the peaceful, 138; and *M. Aurelius Antoninus*, the virtuous, and philosophical, A. D. 161. Of the remaining emperors, some of the most remarkable, were *Commodus*, A. D. 180; *Septimius Severus*, 193; *Caracalla*, and *Geta*, 211; *Heliogabalus*, or Elagabalus, the vicious, 218; *Alexander Severus*, 222; the *Gordians*, 236–8; *Decius*, 249; *Gallienus*, 260; *Claudius*, the second of that name, 268; *Aurelian*, the brave, 270; *Tacitus*, 275; *M. Aurelius Carus*, 282; *Diocletian*, 284; *Constantine* I. the Great, 306; *Julian*, 361; *Jovian*, 363; *Valentinian* I., and *Valens*, 364; *Honorius*, 395; *Valentinian* III., 424; and *Romulus Augustus*, 475; with whom terminated the western empire. (p. 209.)

Of Roman orators, we would mention *Hortensius*, with his great contemporary and rival, *Cicero*, above named; and *Quintilian*, who died A.D. 95. Of Roman *historians*, besides *Julius Cæsar*, the three principal were *Crispus Sallustius*, or Sallust, who died 35 B.C.; *Titus Livius*, or Livy, who died A.D. 17; and *C. Cornelius Tacitus*, who flourished A.D. 97. Of the minor historians, *Valerius Maximus*, flourished A.D. 20; *Velleius Paterculus*, soon after; *Quintus Curtius*, flourished A.D. 60; Florus, 110; Justin, 130; and Eutropius, flourished about 360, during the decline of the empire. Of the biographers, *Varro*, *Nepos*, and *Suetonius*, we have already spoken. (p. 242).

Of the Roman poets, the most distinguished were *P. Virgilius Maro*, or Virgil, who died 19 B. C.; and *Q. Horatius Flaccus*, or

Horace, who died 8 B.C.; both of them patronized by Augustus and Mæcenas. *Plautus*, the comic poet, died about 184: *Terence*, his rival, flourished 167; and *Lucilius*, the satirist, died 103 B.C. Catullus, Propertius, and Tibullus, preceded *Ovid*, the third best poet of Rome, who died A.D. 17. *Phædrus*, the fabulist, flourished about A.D. 20. *Lucan*, was put to death by Nero, A.D. 65; and *Petronius* met the same fate in the following year. *Martial*, died about A.D. 104; and *Juvenal* died A.D. 128. Among the minor poets, were Nævius, Ennius, Pacuvius, Attius, Gallus, Persius, and Seneca; and others, whom we have no room even to name.

Of Roman philosophers, besides *Cicero*, we can only mention *Lucretius*, who died about 54 B.C.; and *Seneca*, who was put to death by Nero, A.D. 65. In sciences and arts, Rome produced *Pomponius Mela*, the geographer, who flourished A.D. 60; *Pliny*, the elder, the naturalist, who perished while observing Vesuvius, A.D. 79; *Celsus*, the physician, who flourished A.D. 20; *Sammonicus*, the physician, who flourished A.D. 200; *Columella*, who wrote on agriculture, in the first century; *Vitruvius*, the architect, who flourished at the Christian era; *Pollio*, who wrote on architecture and mechanics, at the same era: and *Frontinus*, who wrote on the military art, and died A.D. 106.

Our notice of *Byzantine Biography* must be confined to the mention of the following emperors, with their dates of accession: *Arcadius*, the first of the eastern emperors, distinctively so called, A.D. 395; *Theodosius* II., 408; Leo I., the Thracian, 457; Leo II., (Zeno), 474; Anastatius, styled the Silentary, 491; Justin I., the Thracian, 518; *Justinian* I., 527; Justin II., 565; Phocas, 602; Heraclius, 610; Constans II., 642; Justinian II., 685, and 704; *Leo* III., Isauricus, 717; Constantine V., 742; Irene, 797; Michael III., 842; Basilius, 867; *Leo* VI., the philosopher, 886; Constantine VII., Porphyrogenitus, 912, associated with Romanus I., 919; Nicephorus II., (Phocas), 963: and Basilius II., with Constantine VIII., A.D. 975. (p. 209). The renowned general *Belisarius*, died in 565; and *Tribonian*, the lawyer, died in 545. Zosimus, and Procopius, were among the Byzantine historians who wrote in the Greek language; all of whom were of minor note.

CHAPTER II.

ORIENTAL BIOGRAPHY.

The subject of Oriental Biography is very imperfectly known to us; owing to the remoteness of its scenes, the deficiency of its records, and our imperfect knowledge even of those which do exist. It doubtless presents topics of romantic interest, and well worthy of contemplation, which have not yet been exhibited to the western world. The wild and fiery zeal of the Mohamedan conquerors; the self-immolation of their opponents; and the sudden reverses of fortune, so frequent in the eastern world, and so fatal to social improvement, are among the characteristics of this branch, which we have no room more fully to describe. We shall here follow the same general order as in Oriental Chronography: for the reasons therein explained. This arrangement will bring the Biography of all the Mohamedan nations into one connected series; which will be followed by that of the remaining nations, in the east of Asia.

§ 1. Commencing with *Arabian Biography*, the names of the first ten *Caliphs*, or vicarious successors of Mohamed, and the dates of their accession, are as follows: *Abu-Bekir*, (or Aboo Beker, whose original name was Abdallah Ebn Abu Koafas), A. D. 632; *Omar*, the victorious, 634; *Othman*, (or Osman), 644; *Ali*, regarded by the Persians as the first caliph, 656, assassinated 660; *Moawiyah*, (or Moawiah), first of the Ommiades, 660; *Yezid*, (or Jezid), 679; *Moawiyah* II., 683; *Abdallah*, 684; *Merwan* I., same year; and *Abdulmelek*, 685. Among the remaining caliphs were *Walid* I., the victorious, A. D. 705; *Suleiman*, 714; *Hashem*, 723; *Ibrahim*, 744; Abul Abbas, called *Saffah*, or the bloody, first of the house of Abbas, A. D. 750; *Al Mansor*, (Mansur, or Abu Giafar), 754, first of the caliphs of Bagdad; *Haroun al Raschid*, (or Haroon al Rasheed), 786; *Al Mamun*, 813; and *Motasim*, 833; the four last mentioned being known as patrons of learning. *Al Motazem*, (or Mostasem), the last caliph of Bagdad, was put to death, A.D. 1258. *Khaled*, (or Caled), the general of Aboo Beker, died in 639; *Amroo*, (or Amru), the general of Omar, died in 663; and *Thaher*, the general of Al Mamun, flourished in 813.

Of Arabian geographers, we would mention Scherif *Edrisi*, who flourished A. D. 1160; and Ismael *Abulfeda*, prince of Hamah, in Syria, who died in 1333. To this class of writers belong also Al Balkhi, Al Beirouni, and Ibn Essakar. Of historians, besides *Abulfeda* just mentioned, Hesham Schoaib *Alkhekebi* flourished in 818; and *Abulfaragius*, (or Abulpharagius), bishop of Guba in Syria, died in 1286. Other historians were Makrizi, Assoiuti, Aljazri, Elmacin, Tabari, and Arabshah. *Elmanicus*, of Egypt, wrote a Saracen History, in the 13th century. Of Arabian *poets*, besides those of the Moallakat, to be mentioned under Callography, *Montanabbi*, (or Motenabbi), was killed by robbers, in 965; Abu Ismael *Tograi*, (or Thograi), vizier of Bagdad, flourished in 1100; Abu Temam, in 830; and Bochteri, in 880. Other poets were Abu Becr, Al Nasaphi, Shafari, Abu Mansur, Al Gazi, and Ibn Zadun. *Admai*, (or Asmai), the great romancer, flourished at the court of Haroon al Rasheed, in 800; and Ithiel *Hariri*, and Abu *Dschafar Ibn Tophail*, also excelled in romance.

Of scientific Arabians, we would name as astronomers, besides the caliph Al Mamun, *Albategnius*, (or Albatani), of Mesopotamia, who died 888; *Alhazen*, of Spain, who flourished about 1100; and *Aben Ragel*, who lived in the thirteenth century. *Al Farabi*, (or Alfarabius), the natural philosopher, flourished in 954. *Almubassar*, was a follower of Aristotle. Among the Arabian physicians, were *Serapion*, who flourished about 800; *Rhazes*, about 880; and *Geber*, and *Halyabbas* at about the same time. *Avicenna* died in 1036; *Albucasis*, in 1106; *Avenzoar*, of Spain, died at Morocco, in 1169; and *Averroes*, of Cordova, who was famed for general learning, died at Morocco, about 1220. Most of these physicians were also alchemists.

§ 2. We shall commence *Turkish Biography*, by giving the names of the Sultans, and the dates of their accession, since the conquest of Constantinople. They are *Bajazet*, (or Bayazeed) II., 1481; Selim I., 1512; *Soliman* II., (or Suleiman), the magnificent, 1520; Selim II., 1566; Amurath III., 1574; Mohamed III., (or Mahomed), 1595; Ahmed I., (or Achmet), 1604; Mustapha, (or Mustafa), 1617; Amurath IV., 1623; Ibrahim, 1640; Mohamed IV., 1655; Soliman II., 1687; Ahmed II., 1690; Mustapha II., 1695; Ahmed III., 1703; Mahmood I., (or Mahmoud), 1730; Mustapha III., 1757; Abdul Ahmed, 1774; Selim III., 1789; Mustapha IV., 1807; Mahmood II., 1808; and Abdul Medjid, 1839. Of Turkish *historians*, Saad-ed-din, who was also mufti of Constantinople, died in 1599. His work was followed by those of Naima, Raschid, and Hadschi Chalfa, surnamed *Tchelebisade*, who was also an encyclopædist, and died in 1657. Of Turkish *poets*, we would mention *Baki*, the lyric poet, who died in 1600; *Molla Khosrew*, the romancer; and *Abdul Latifi*, who made a collection of minor poems, or a Turkish Anthology. Abdorrhaman Effendi, was a Turkish mathematician, who flourished in 1793.

In modern *Persian Biography*, we have room to give the sovereigns of the Suffavean dynasty only, with their dates of accession, as follows. Shah Ismaïl, 1504; Tamasp, (or Thamas), 1523; Ismaïl II., 1576; Mohammed Meerza, 1577; Hamzeh, 1586; *Abbas*, the Great, 1587; Sam Meerza, (or Shah Suffee), 1629; Abbas II., 1642; Suffee Meerza, (or Shah Suleiman, or Soliman), 1666; Hoossein, 1694; Meer Mahmood, the Affghan, 1722; Ashraff, the Affghan, 1725; Tamasp II., (or Thamas), son of Hoossein, 1729; Abbas III., 1732; Nadir Shah, (Thamas Kouli Khan), 1736; Adil Shah, 1747; Ibrahim, 1748; Kerreem Khan, (or Kerim, 1753; Ali Murat, 1784; Aga Mohammed, 1789; Feth Ali, (or Futteh Ali Khan), 1796; and Mohammed, 1834. Of Persian *historians*, we would mention *Abu Said*, (or Abulkasin Beidavi), who flourished in 1276; *Kazwini*, who died in 1351; *Turan Shah*, who died in 1377; *Chowand Shah*, who flourished in 1741; and *Ferishta*, at about the same date. Among the Persian *poets*, *Ferdusi*, flourished in 1020; *Sadi*, (or Saadi), of Shiraz, died in 1292; *Hafiz*, (or Hafez), died in 1389; *Jamy*, (or Djamy Abdalrahman), died in 1494; *Hatifi*, died in 1520; and *Nizami*, (Nisami or Nisam), flourished in 1690. *Ansari*, (Ansseri or Anasari), flourished A. D. 1000; *Anvari*, (Anweri, or Enweri), died in 1200; *Khakani*, (or Chakani), was his contemporary; and *Roumi* of Balk, surnamed Balkhi, died in 1262. *Rudigi* is a modern poet; and *Blab Phelair*, a recent poet of note, died in 1825. Other poets will be mentioned under Persian Callography. Of Persian *astronomers*, we would mention *Omar Chehan*, who flourished in 1072; and *Nassir Eddin*, (or Nasereddin), of Thus, in 1259.

§ 3. The *Biography of the East Indies*, is less known to us, than that of any other part of the civilized world. We shall commence that of Hindoostan, by naming some of the *great Moguls*, chiefly those who were the most distinguished. *Baber*, (Babur or Baba), the first of this series, died in 1530. *Shere*, the Afghan, died in 1545; and *Houmaioun*, the son of Baber, after regaining his throne, died in 1555. His son, *Akbar*, (or Acber), the fortunate, died in 1605; and *Jehan Ghire*, (Jehanghire, or Selim), died in 1628. *Shah Jehan*, died about 1660; and his son, the ambitious and renowned *Aureng Zebe*, died in 1707. After the short reigns of Bahauder, Jehaunder, and Mahomed Shah, and the Persian conquest by *Nadir Shah*, already mentioned, (p. 213), the great Moguls, from their diminished power, became of minor consequence. The principal native chiefs who were subdued by the British, have been mentioned in the preceding department. Of Hindoo *historians*, we would mention, besides the emperor, *Jehan Ghire*, (or Jehan Guir), the vizier, *Abul Fazl*, who wrote in the Persian language, and was put to death in 1604. Of the Hindoo *poets*, *Valmiki* and *Vyasa* flourished long before the Christian era; and *Calidas* flourished 60 B. C. Other Hindoo poets, and the fabulous name of *Pilpay*, will be referred to under Hindoo Callography.

Under *Chinese Biography*, we give the names of the emperors of the present (22d, or Tai Tsin) dynasty, with the dates of their accession, as follows: *Shun-chi*, or Shee-tsong, 1644; *Kang-hee*, (Kang-hi), or Shin-tsoo-gin, 1662; *Yong-ching*, (Yong-tching), or Shee-tsong-hien, 1723; *Kien-long*, (or Kien-lung), 1736; *Kia-king*, 1796; and *Tao-kwang*, (Tara-kwang, or Daoguan), 1821. Of Chinese *historians* we would mention Con-fu-tse, (Kung-fu-dsu), or *Confucius*, who was also a poet and moralist, and flourished about 550 B. C.; and Meng-tseu, or *Mencius*, his successor, and commentator, who died 314 B. C. *Se-ma-tsien*, was also a Chinese historian; and the recent emperor *Kien-long*, may be mentioned among the Chinese poets.

CHAPTER III.

EUROPEAN BIOGRAPHY.

The branch of European Biography, is very extensive, and abounds in distinguished characters, in all the walks of life. Next to that of our own country, it presents to us lessons the most available for practical benefit; as the circumstances of the European nations are, of all others, the most similar to our own; and therefore afford precedents the most suitable for our guidance. All that we can here attempt, is an enumeration of some of the most renowned and meritorious characters, in such a manner as to give an idea of their relative position, in the scale of time, and the circle of nations; by which the reader will be enabled to study them in a connected and natural order, on referring to extensive biographical works. It is gratifying to observe, that the names distinguished in the cause of learning and philanthropy, may at least rival the number of those renowned in arms or in power; while not a few of the latter may also be reckoned among the former. By this retrospect, we are also encouraged to hope that the prejudices and jealousies which have in time past opposed barriers to international intercourse, are gradually disappearing; and that the various nations will henceforward become more and more united, in a reciprocity of kindness and beneficence. In pursuing this branch of Biography, we shall of course follow the geographical order, adopted in the preceding departments.

§ 1. The Biography of *Modern Greece*, relates chiefly to the leaders in the late Revolution; among whom were *Mavrocordato*, the first president; *Colocotroni* and *Conduriottis*, who were among his successors; the brothers *Ypsilanti*, of whom Alexander died in prison at Vienna, in 1828; *Mavromichalis* the Patriotic; and *Marco Bozzaris*, the Brave, who fell in the arms of victory, in 1823.

The subject of *Italian Biography*, naturally commences with an enumeration of some of the most distinguished *Popes*, and the date of their accession. Reckoning from the apostolic age, their whole number is about 258; but we have room to give the names only of the following. *Leo* I., called the Saint, A. D. 440; Hilary, (or Hilarius), 461; Felix II., 483; Symmachus, 498; Hormisdas, 514; Pelagius I., 556; John III., 560; *Gregory* I., surnamed the Great, 590; *Boniface* III., 606; (see p. 218;) Honorius I., 626; *Theodore* I., 641, the first who was styled sovereign pontiff; Vitalianus, (or Vitellianus), 655; *Domnus*, 676; Benedict II., 684; Sergius I., 687; Constantius, (or Constantine), 708; Gregory II., 714; Gregory III., 731; Zachary, (or Zacharius), 741; *Stephen* III., 752, the first who acquired territorial sovereignty; Adrian I., 772; *Leo* III., 795; Paschal I., 817, who first created cardinals; Leo IV., 847; *John* VIII., 872; Benedict IV., the virtuous, 905; Anastatius III., 910; John X., 913; Martin III., 943; John XIII., 965; John XVI., 985; Benedict VIII., 1012; John XIX., 1024; *Leo* IX., 1049; *Gregory* VII., (Hildebrand), 1073; Urban II., 1088; Eugene III., 1145; Alexander III., 1159; Clement III., 1188; *Innocent* III., 1198; Gregory IX., 1227; Gregory X., 1271; Boniface VIII., 1294; Clement V., 1305, who removed to Avignon; Gregory XI., 1370, who restored the papal chair to Rome; John XXII., 1410; Martin V., 1417; Pius II., 1458; Alexander VI., the vile, 1492; *Leo* X., (Giovanni or John de Medici), 1513, who opposed the Reformation; Paul III., the licentious, 1534; Pius V., 1566; *Gregory* XIII., 1572; Sixtus V., 1585; Clement VIII., (Aldobrandini), 1592; Paul V., 1605; Urban VIII., 1623; Innocent X., 1644; Clement X., 1670; Clement XI., 1700; *Benedict* XIV., (Lambertini), 1740; *Clement* XIV., (Ganganelli), 1769; Pius VI., 1774; Pius VII., 1800; Leo XII., 1822; Pius VIII., 1829; and Gregory XVI., 1831.

Of Italian statesmen and warriors, *Obizzo of Este*, first leader of the Guelfs, or papal party, flourished about 1130; as did also his rival, *Eccelino Romano*, (or Da Romano), the first chief of the Ghibelines. The Este family were of Modena; the Romano, of Verona and Padua. *Eccelino Romano* III., the cruel, was defeated by *Azzo of Este*, and killed himself about 1260. Nicolas II. of Este, who died 1388, and Nicolas III., who died in 1441, were distinguished patrons of learning. So were also *Cosmo de Medici*, chief of Florence, who died in 1464; and his grandson, *Lorenzo*, called the Magnificent, who died in 1492. *Gian Galeazzo Visconti*, a descendant of Lucchino, and duke of Milan, died of the plague in 1402. *Machiavelli*, the politician, of Florence, died in 1530; and *Andrew Doria*, the defender and doge of Genoa, died in 1560. Of the Ricci, Albizzi, Strozzi, Scali, and Alberti of Florence; the Torri and Visconti of Milan; and numerous other distinguished families, we have no room here to speak. *Nicholas Rienzi*, (Cola di Rienzi), the popular tribune of Rome, celebrated in romance, was slain in 1354.

Of Italian voyagers and travellers, we have only room to mention *Marco Polo*, (or Paulo), who flourished in 1272; the brothers *Zeno*, (or the Zeni), in 1390; the great *Columbus*, (Cristoval Columbo), who died in 1506; *Vespucius*, (Amerigo Vespucci), who died in 1512; and his rival contemporaries, John Cabot, and Verrazano. Of the Italian historians, besides Machiavelli, we would mention *Guicciardini* of Florence, who wrote a history of Italy, and died in 1540; *Sarpi*, called Father Paul, or Fra Paolo, of Venice, who died in 1623; *Davila*, who lived in France and Venice, and died in 1631; *Bentivoglio*, the cardinal, who died in 1644; *Muratori*, who wrote several works, and died in 1750; and *Botta*, who died in 1837. Davila wrote on French history; Bentivoglio on Flemish; and Botta on American. Among other Italian historians, we may name Nerli, Nardi, Segni, Varchi, Denina, Colletta, Serra, Varese, Sforzosi, and Giannone.

Of the Italian poets, *Dante Alighieri*, of Florence, died at Ravenna, in 1321; *Francesco Petrarca*, or Petrarch, born at Florence, died near Padua, in 1374; *Ludovico Ariosto*, died at Ferrara, in 1533; and *Torquato Tasso*, after an unhappy life, died at Rome, in 1595. Sannazaro died in 1533; Trissino of Vicenza, died at Rome in 1550; Vida died in 1566; Guarini, in 1612; and Maffei, in 1755. *Metastasio*, the dramatist, died at Vienna, in 1782; *Goldoni*, of Venice, died in 1792; *Alfieri*, of Piedmont, a dramatic and epic poet, died at Florence, in 1803; and *Ugo Foscolo*, died near London, in 1827. Boccacio, the novelist, of Florence, died at Certaldo, in 1375.

In the physical sciences, Italy has produced *Galileo*, (Galilei), who was patronized in Venice and Florence, persecuted in Rome, and died in 1642; *Torricelli*, his pupil, who died at Florence, in 1647; *Boscovich*, who died at Milan, in 1787; *Galvani*, of Bologna, who died in 1798; and *Volta*, the electrician, and *Piazzi*, the astronomer, both of whom died in 1826. *Cæsalpinus*, of Arezzo, the physician and botanist, died in 1603; *Aldrovandi*, of Bologna, the naturalist, died in 1605; and *Spallanzani*, the naturalist, died in 1799. Among other Italian physicians, *Mondini*, (or Mundinius), of Bologna, flourished in 1315; *Berengarius* died in 1527; *Fracastorio*, (or Fracastor), in 1553; *Fallopius*, in 1563; *Vessalius*, in 1564; *Eustachius* died at Rome, in 1574; *Asellius*, died in

1626; *Borelli*, in 1679; *Bellini*, in 1703; and *Baglivi* died in 1706. Among the earlier physicians, was Fabricius Aquapendente.

Of Italian artists, *Palladio*, the architect, died in 1580; *Michael Angelo Buonarotti*, the famed architect, painter, and sculptor, died in 1563; *Cellini*, the sculptor and painter, died in 1570; *Bernini*, the architect, painter, and sculptor, died in 1680; and *Canova*, the sculptor, died at Venice, in 1822. Of the remaining Italian painters, *Leonardo da Vinci*, styled the head of the Florentine school, died in 1519; and *Raphael*, (Sanzio da Urbino), head of the Roman school, died in 1520. To the Roman school also belonged Michael Angelo, already named; Giulio Romano, and Penni, called Il Fattore; *Salvator Rosa*, who died in 1673; and *Carlo Maratti*, who died in 1713. The Florentine school includes the earlier painter, *Cimabue*, who died in 1300; as also Luini and Perugino, *Fra Bartolomeo*, (Baccio della Porta), who died in 1517; and *Andrea del Sarto*, who died in 1520. *Carlo Dolce*, who died at Florence in 1686, is usually classed with the Florentine school. To the Venetian school belong *Giorgione*, (Barbarelli di Castelfranco), who died in 1511; the famous *Titian*, (Tiziano Vercelli), who died of the plague in 1576, at the age of 99; *Paul Veronese*, (Cagliari of Verona), who died in 1588; the elder Bassano, who died in 1592; and *Tintoretto*, (Robusti), who died in 1594. Of the Lombard school, *Correggio*, (Antonio Allegri), its founder, died in 1534; *Lodovico Carracci* died in 1619, having survived his cousins, Agostino and Annibale Carracci; *Domenichino*, (Domenico Zampieri), their pupil, died in 1641; and *Guido Reni*, another pupil of the Carracci, died in 1642. *Caravaggio*, (whose first name was Michael Angelo), head of the natural school, died in 1609. Of Italian musicians, Piccini died in 1800; Cimarosa, in 1801; Paesiello, in 1816; and Paer, in 1839. Bellini died, we believe, in 1838; and Zingarelli, in 1839.

§ 2. We shall commence the section on *Spanish Biography*, by giving the names of the sovereigns, since Spain became one united kingdom, with the dates of their accession. Ferdinand and Isabella, were married in 1479; *Charles* I., (the emperor Charles V.), acceded to the throne in 1516; Philip II., in 1556; Philip III., in 1598; Philip IV., in 1621; Charles II., in 1665; Philip V., in 1700; Ferdinand VI., in 1746; Charles III., in 1756; Charles IV., in 1788; and Ferdinand VII. in 1808; but Joseph Bonaparte was sovereign from 1808 to 1814, when Ferdinand was restored; and he was succeeded by his daughter Isabella II., in 1833. Of Spanish warriors and statesmen, *Don Rodrigo*, called the Cid, and the flower of Spanish chivalry, died in 1099. *Hernandes Gonsalvo*, called the great captain, so victorious against the Moors, died in 1515; and *Francisco Ximenes*, cardinal, and prime minister, the conqueror of Oran, in Africa, died in 1517. *Alvarez*, (duke of Alva), the cruel viceroy of the Netherlands, died in 1582. *Gaspar de Guzman*, (count of Olivarez), prime minister of Philip IV., died in 1645; and *Giulio Alberoni*, cardinal, and prime minister of Philip V., died in 1752. *Don Manuel de Godoy*, prince of peace, the unworthy favorite of Charles IV., is, we think, still living. The patriot *Riego* was put to death in 1823; but his coadjutor *Mina*, we believe, still survives.

Of Spanish voyagers and explorers, *Almagro* was slain in 1538; *Pizarro*, in 1541; *Cortez* died in 1554; *Orellana* died about 1550; *Ponce de Leon* flourished in 1512; *De Solis*, in 1517; *Valdivia*, in 1541; *Saavedra*, in 1526; *Mendana*, in 1567; and *Quiros* in 1606. Of Spanish historians, *Zurita* flourished in 1579; and *Mendoza* in 1584; *Mariana* died in 1623; *Herrera*, (Tordesillas), died in 1625; and Antonio de *Solis*, died in 1686. *John Leo*, the biographer, died about 1526. Of the Spanish poets, the marquis *Henry de Villena*, died in 1434; *Iñigo de Mendoza*, was his pupil; *Juan de Mena*, died in 1456; *Garcilaso de la Vega*, in 1536; *Juan Boscan*, in 1543; *Hernando Herrera*, in 1578; *Louis de Leon*, in 1591; *Ercilla y Zuñiga*, died about 1600; and *Louis Gongora*, died in 1627. *Cervantes*, (Saavedra), the poet and novelist, died in 1616; don *Lope de Vega*, of Madrid, the dramatist, died in 1635; and don *Pedro Calderon*, (or Calderona), his rival, died in 1687. *Vincent Garcias de la Huerta*, the recent dramatist, flourished in 1778; and *Yriarte*, the fabulist, at the same date. Prince *Juan Manuel*, the novelist, died in 1362; and *Mattheo Aleman* flourished in 1580. Of the Spanish painters, *Murillo*, of Seville, died in 1682; and *Velasquez*, of Seville, his patron, died in 1660. Zusbaran and Vargas, were painters of less note.

The sovereigns of *Portugal*, since it was last separated from Spain, are John IV., of Braganza, 1640; Alfonso VI., 1656; Peter II., 1668; John V., 1706; Joseph, 1750; Maria Francisca, 1777; John VI., as regent, 1799; and Maria II., in 1826. The romantic king *Sebastian*, (or Don Sebastian), fell in Africa, in 1578. The infante don *Henry*, called the Navigator, the pioneer in southern discoveries, died in 1463. *Vasco de Gama*, who first sailed around Africa to India, died at Goa, in 1524. *Alfonso de Albuquerque*, the admiral and Asiatic conqueror, died at Goa, in 1515. *Fernando de Magellan*, (or Magalhæns), the first circumnavigator, under Spanish patronage, was killed at the Philippine Islands, in 1521. *Bartholomew Diaz*, who discovered the Cape of Good Hope, flourished in 1486; but the time of his death we have not been able to ascertain.

Of Portuguese historians, besides the admiral Albuquerque, *Barhas*, (or Barras), also a novelist, died in 1571; *Brito*, (or Debrito), died in 1617; *Manuel y Souza*, flourished in 1610; and *Freire de Andrade*, the biographer and poet, flourished soon after. Of Portuguese *poets*, the most celebrated is *Louis de Camoens*, who died in 1579. *Bernardin Ribeyro*, flourished in 1510; and Andrade Caminha and Falcum were his contemporaries. *Gil Vicente* died in 1557; Miranda, in 1558; *Ferreira*, in 1569; *Lobo* flourished in 1560; *Corteréal*; (or Corte Real); in 1570; and Bacelar in 1640. Montemayor died in 1558; and Bernardes Pimenta, in 1596. *Meneses*, count of Ericeyra, died in 1744, and *Basilio da Gama*, was his contemporary: *Bocage* died in 1805; and *Manoel*, in 1819. Of Portuguese *novelists*, besides Ribeyro and Barhas, we would mention Moraez and Carvalho; *Lobeira*, who died in 1403; and *Ferreira de Vasconcellos*, who flourished about 1580.

§ 3. We commence the section of *French Biography*, by giving the names of the French sovereigns, from the Capetian dynasty, inclusive, with the dates of their accession; as follows. *Hugh Capet*, A. D. 987; Robert I., the Wise, 996; Henry I., 1031; Philip I., the Amorous, 1061; Lewis (or Louis) VI., the Fat, 1108; Lewis VII., the Young, 1137; *Philip* II. *Augustus*, 1180; Lewis VIII., the Lion, 1223; *Lewis* IX. *the Saint*, 1226; Philip III., the Bold, 1270; Philip IV., the Fair, 1285; Lewis X., 1314; John I., 1315; Philip V., the Long, 1316; and Charles IV., the Fair, 1321; all of the house of Capet. They were followed by *Philip* VI., *of Valois*, the Fortunate, 1328; John II., 1351; Charles V., the Wise, 1364; Charles VI., the Beloved, 1380; Charles VII., the Victorious, 1422; Lewis XI., 1461; Charles VIII., 1483; Lewis XII., 1498; *Francis* I., 1515; Henry II., 1547; Francis II., 1559; Charles IX., 1560; and Henry III., 1574; who was the last of the house of Valois. To these succeeded *Henry* IV., the Great, of Bourbon, 1589; Louis (or Lewis) XIII., 1610; *Louis* XIV., 1643; Louis XV., 1715; Louis XVI., 1774; (Louis XVII., nominally in 1796); *Napoleon Bonaparte*, in 1804; Louis XVIII., in 1814; Charles X., in 1824; and *Louis Philippe* of Orleans, in 1830.

Of French statesmen and warriors, *Godfrey of Bouillon*, who took Jerusalem in the first Crusade, died there, A. D. 1100. *Bertrand du Guesclin*, constable of France, and general of Charles V., died in 1380. *Joan of Arc*, the heroine, was burnt by the Inquisition, in 1431. *Gaston de Foix*, nephew, and general of Lewis XII., died in 1512; and the chevalier *Bayard*, (Pierre du Terrail), the knight without fear and without reproach, died of a wound, in 1524. *Charles*, duke and *constable of Bourbon*, unjustly banished, was killed in attacking Rome, in 1527. *Anne de Montmorency*, general of Francis I., died of wounds, in the war against the Huguenots, in 1567; and *Gaspard de Coligny*, his antagonist, fell in the massacre of St. Bartholomew, 1572. The chancellor, *Michael de l'Hopital*, shared the same fate. *Henry of Guise*, the catholic duke of Lorraine, was slain by order of Henry III., in 1588. The duke of *Sully*, (Maximilian de Bethune), the able financier of Henry IV., died in 1641. Cardinal *Richelieu*, (Armand Jean du Plessis), minister of Louis XIII., died in 1642. Cardinal *Mazarin*, (Julius), the first prime minister of Louis XIV., died in 1661; Cardinal de *Retz*, his rival, died in 1679; and *Jean Baptiste Colbert*, his successor, renowned as a financier, died in 1683.

Marshal *Turenne*, general of Louis XIV., fell in 1675; and his coadjutor, the prince of *Condé*, (Louis de Bourbon, ancestor of the duke d'Enghien), died in 1687. Marshal *Luxembourg*, (Montmorency), died in 1695; Marshal *Vauban*, the engineer, died in 1707; and Marshal *Villars*, in 1734. Cardinal *Fleury*, minister of Louis XV., died in 1743. *James Turgot*, who died in 1781; and *James Necker*, of Geneva, who died in 1804, were ministers of Louis XVI. Of the cruel revolutionary triumvirate, *Danton* and *Robespierre* were guillotined in 1794, and *Marat* was assassinated in 1793. *Napoleon Bonaparte*, the ex-emperor, died at *St. Helena*, in 1821. Of his generals, including *Murat*, ex-king of Naples, and *Ney*, who were shot in 1815, Massena, Larrey, Kléber, Lannes, Desaix, Davoust, Lasalle, Suchet, Bessière, Soult, Macdonald, Grouchy, and others, we have no farther room here to speak. *La Fayette*, the patriot and philanthropist, died in 1834; and *Talleyrand*, the famed diplomatist, died in 1838.

Of French *lawyers*, we can here only mention *Domat*, who died in 1696; *Ferrière*, the elder, in 1715; *Burlamaqui*, of Geneva, who died in 1748; the chancellor *D'Aguesseau*, in 1751; *Montesquieu*, who died in 1755; *Vattel*, of Swiss birth, who wrote in French, and died in 1767; *Pothier*, who died in 1772; *De Lolme*, of Geneva, who died in 1807; and *Lacretelle*, who died in 1824. Of French *divines*, *Robert of Sorbonne*, founded the Sorbonne, or Theological college in Paris, about 1250. *John Calvin*, the reformer, born in France, died at Geneva, in 1564; and *Theodore Beza*, his successor, died in 1605. *Martin Bucer*, another distinguished reformer, died in England, in 1551. *Cornelius Jansenius*, founder of the sect of Jansenists, opposed to the Jesuits, died in 1638. *Jaques Benigne Bossuet*, bishop of Meaux, who wrote on Universal History, died in 1704; and *Louis Bourdaloue*, in the same year. *Francois Fenelon*, the pious archbishop of Cambray, died in 1715; and *Jean Baptiste Massillon*, the eloquent prelate of Sevigny, died in 1742. Of the French *schoolmen*, or scholastic philosophers, *Peter Abelard*, died in 1142; and *Thomas Aquinas*, (or St. Thomas, called the angelic doctor), founder of the sect of Thomists, as also *John Bonaventura*, (or St. Bonaventure, styled the seraphic), both of Italian birth, both died in 1274.

Of French voyagers and geographers, we can only mention here *Gonneville*, who flourished in 1503; *Cartier*, in 1542; *Champlain*, who died in 1635; *Tavernier*, who died in 1689; *La Peyrouse*, who was probably lost at sea, in 1788; and *D'Anville*, the celebrated geographer, who died in 1782. Of French *historians*, *John Froissart*, the chronicler, died in 1401; *Philip de Comines*, died in 1509; *Pierre Brantôme*, in 1614; *James de Thou*, (Thuanus), in 1617; *Francis de Mézerai*, in 1683; Pelisson, in 1693; Varillas, in 1696; *Peter Bayle*, in 1706; *Nicholas Boileau*, in 1711; *Vertot d'Aubœuf*, in 1735; *Charles Rollin*, in 1741; *Crevier*, in 1765; *Francis de Voltaire*, in 1778; *Claude Millot*, in 1785; *Honoré Mirabeau*, in 1791; *William Raynal*, in 1796; and Count *Louis de Segur* died in 1830. The statesmen Sully, and de Retz, also wrote on history; and the brothers Michaud, as also Thouret, Thiers, and others, are, we believe, still living. The abbé *Barthélemy*, celebrated as an archæologist, died in 1795.

Of the French poets, *William*, count of Poitou, called the first troubadour, flourished about 1071; and *Thibaut*, count of Champagne and king of Navarre, died in 1253. *Clotilde* du Vallon Chalys, (de Surville, by marriage), died about 1500; *Clement Marot*, in 1551; *Du Bellay*, in 1560; *Jodelle*, in 1573; and *Ronsard*, in 1585. *Desportes* died in 1600; *Malherbe*, in 1627; *Sarrazan*, in 1654; and the marquis of *Racan*, (du Breuil), in 1670. *Jean B. de Moliere*, died in 1673; *Pierre Corneille*, in 1684; *Thomas Corneille*, his brother, in 1709: *Jean de la Fontaine*, in 1695; *Jean Racine*, in 1699; and Madame *Deshoulières*, in 1694. *Segrais* died in 1701; *Jean Baptiste Rousseau*, in 1741; *Fontenelle*, in 1757: *Crébillon*, in 1762; *Pompignan*, in 1784; Bertin, in 1790; and Chenier, in 1794. *Ponce-Denis Le Brun*, died in 1807; *Jacques Delille*, in 1813; and Count *Coëtlogon*, in 1826. Froissart, Boileau, and Voltaire, have been mentioned among the historians; and among other poets, *Chateaubriand* and *Lamartine* are, we believe, still living. Of French *novelists*, besides Rousseau, Voltaire, and Chateaubriand, we can only name *Rabelais*, who died in 1553; *Montaigne*, the essayist, who died in 1592; Mlle. de *Scuderi*, who died in 1701; *Le Sage*, in 1747; *Marmontel*, in 1798; Madame de *Cottin*, in 1807; *St. Pierre*, in 1814; Madame de *Stael*, in 1817; and Madame de *Genlis*, in 1830.

In the physical sciences, France presents many distinguished names. Of mathematicians, *Descartes*, also a metaphysician, died at Stockholm, in 1650; *James Bernouilli* died in 1705; and his brother, *John*, in 1748: *Delahire*, in 1718; *Clairault*, in 1765; *D'Alembert*, in 1783; *Condorcet*, also a politician, died in 1794; *Lagrange*, in 1813; and *Monge*, in 1818. *Gassendi*, the astronomer, died in 1655; *Lacaille*, in 1762; and *Laplace*, the mathematician and astronomer, died in 1827. *Fermat*, the mechanician, died in 1664; *Pascal*, in 1662; *Coulomb*, in 1806; and *Poisson*, in 1840. *Arago*, *Biot*, and *Ampère*, are, we trust, still living. Of French chemists, *Lavoisier* died in 1794; *Fourcroy*, in 1809; *Guyton de Morveau*, in 1816; and *Berthollet*, of Swiss birth, died in 1822. *Gay Lussac*, and *Vauquelin* are, we believe, still living. Of French naturalists, *Tournefort* died in 1708; *Anthony de Jussieu*, in 1758; and his brother, *Bernard*, in 1777: *Buffon* died in 1788; *Saussure*, in 1799; the abbé *Haüy*, in 1822; and *Cuvier*, in 1832. Decandolle, Lamarck, and Brongniart, are, we believe, still living. Of French physicians and surgeons, *Paré* died in 1590; *Pecquet*, in 1674; *Geoffroy*, in 1731; *Sauvages*, in 1767; *J. L. Petit*, in 1750; *Anthony Petit*, in 1794; *Desault*, in 1795; and *Bichat*, in 1802.

Of French painters, *Eustache Le Sueur*, historical painter, died in 1655; *Nicholas Poussin*, his rival, died in 1665; *Gaspar Poussin*, landscape painter, died in 1675; and *Claude Lorraine*, of the Venetian school, died in 1682. *Claude Joseph Vernet*, the marine painter, died in 1789; and some of his descendants are also distinguished painters. *Girodet-Trioson*, died in 1824; and *David*, the recent historical painter, died in exile, at Brussels, in 1825. Of French sculptors, *Puget* died in 1694; and *Falconet*, in 1791. Of French musical composers, we can only name Boieldieu, who died in 1834; and Le Sueur, and Auber, who, we believe, are still living.

§ 4. We commence the section on *British Biography*, by giving a list of the sovereigns, with the dates of their accession, from the time of the Saxon Heptarchy. Of the Anglo-Saxon line were Egbert, 828; Ethelwolf, 838; Ethelbald, 857; Ethelbert, 860; Ethelred, 866; *Alfred*, the Great, 872; Edward, the Elder, 900; Athelstan, 925; Edmund I., 941: Edred, 948: Edwy, 955; Edgar, the Peaceable, 959; Edward II., the Martyr, 975; Ethelred II., the Unready, 978; Edmund II., Ironside, 1016; to whom succeeded the Danish conquerors, *Canute*, the Great, 1017; Harold Harefoot, 1036; and Canute II., (Hardicanute), 1039; after which the Saxon line was restored in Edward III., the Confessor, 1041; and Harold II., 1066. Next succeeded the Norman line, of *William*, the Conqueror, 1066; William II., Rufus, 1087; Henry I., 1100; and Stephen of Blois, 1135; who was followed by the house of Plantagenet, comprising *Henry* II., Plantagenet, 1154; *Richard* I., Cœur de Lion, 1189; John, Lackland, 1199; Henry III., of Winchester, 1216; Edward I., Longshanks, 1272; Edward II., of Caernarvon, 1307; Edward III., of Windsor, 1327; Richard II., of Bourdeaux, 1377; *Henry* IV., Bolingbroke of Lancaster, 1399; Henry V., of Monmouth, 1413; Henry VI., of Windsor, 1422; *Edward* IV., of York, 1461; and Edward V., and Richard III., the Hunchback, in 1483. Next came the house of Tudor; *Henry* VII., 1485; Henry VIII., 1509; Edward VI., 1547; Mary, 1553; and Elizabeth, 1558: next the house of Stuart; *James* I., 1603; Charles I., 1625; the Commonwealth under Oliver Cromwell, 1649; Charles II., 1660; James II., 1685; *William* III., and Mary, 1689; and Anne, 1702; and lastly, the house of Brunswick, *George* I., 1714; George II., 1727; George III., 1760; George IV., 1820; William IV., 1830; and Victoria, 1837.

Of British statesmen and warriors, *Edward*, the Black prince, son of Edward III., died in 1376. *Henry Percy*, of Northumberland, called Hotspur, fell at Shrewsbury, in 1403. *John Talbot*, first earl of Shrewsbury, fell in fighting the French, in 1453. The earl of *Warwick*, called the king maker, fell at the battle of Barnet, in 1441. Cardinal *Wolsey*, minister of Henry VIII., died in 1530. The good Sir *Philip Sidney*, died of a wound, near Zutphen, in 1586; Sir *Francis Walsingham*, died in 1590; and Sir *Walter Raleigh*, was beheaded in 1618. *George Villiers*, the unworthy duke of Buckingham, was assassinated in 1628; and *Thomas Wentworth*, earl of Strafford, was beheaded in 1641. Admiral *Robert Blake*, died in 1657. *Edward Hyde*, earl of Clarendon, chancellor, and historian, died in 1674. *Algernon Sidney*, the patriot, was beheaded in 1683; and *Anthony Ashley Cooper*, first earl of Shaftsbury, died in the same year. *John Churchill*, duke of Marlborough, the renowned general, died in 1722. *Robert Walpole*, earl of Oxford, died in 1745; and his rival, *Henry St. John*, viscount Bolingbroke, died in 1751. *William Pitt*, earl of Chatham, died in 1778; and *Edmund Burke*, the orator, in 1797. *Horatio Nelson*, the renowned admiral, fell at Trafalgar, in 1805. Charles James *Fox*, died in 1806; William *Pitt*, the same year; Richard Brinsley *Sheridan*, in 1816; and George *Canning*, in 1827. *Arthur Wellesley*, duke of Wellington, still lives to enjoy his well-earned reputation. Of British jurists, Sir *Thomas Littleton*, died in 1481; Sir *Edward Coke*, in 1634; Sir *Matthew Hale*, in 1676; Sir *William Blackstone*, in 1780; and *William Murray*, earl of Mansfield, died in 1793.

Of British divines, commencing with the schoolmen, *Alexander Hales*, styled the irrefragable, died in 1245; *John Duns*, usually called Duns Scotus, and styled the subtle doctor, founder of the sect of Scotists, (Realists), died in 1308; and *William Occam*, styled the invincible, and leader of the sect of the Nominalists, died in 1347. *John Wickliffe*, the reformer, died in 1384; *William Tyndal* suffered martyrdom in 1536; *Hugh Latimer* and *Nicholas Ridley*, in 1555; and *Thomas Cranmer*, in 1556. *John Knox*, the Scotch reformer, died in 1572. *Richard Hooker*, died in 1600; *James Usher*, archbishop of Armagh, the chronologist, died in 1656; and *Jeremy Taylor*, died in 1667. *Richard Baxter*, the non-conformer, died in 1691. *John Tillotson*, archbishop of Canterbury, died in 1694; and *Gilbert Burnet*, bishop of Sarum, died in 1715. Dr. *Isaac Watts*, died in 1748; and Dr. *Philip Doddridge*, in 1751. *Joseph Butler*, bishop of Durham, died in 1752; and *William Warburton*, bishop of Gloucester, in 1779. *John Wesley*, died in 1791; Dr. *William Paley*, in 1805; and *Robert Hall*, in 1831. *Reginald Heber*, the poet, bishop of Calcutta, died in India, in 1826. Of mental philosophers, *John Locke* died in 1704; *Thomas Reid*, in 1796; *Thomas Brown*, in 1820; and *Dugald Stewart*, in 1828.

Of British voyagers and travellers, *Sebastian Cabot* died about 1557; Sir *Thomas Cavendish*, in 1592; Sir *Francis Drake*, in 1595; Capt. *John Davis*, in 1605; Capt. *Henry Hudson*, in 1611; Capt. *William Baffin*, in 1616; Capt. *John Smith*, in 1631; Capt. *William Dampier*, probably about 1715; Capt. *Woods Rogers*, in 1732; Com. *George Anson*, in 1762; Com. *John Byron*, in 1786; Capt. *James Cook*, in 1779; and Capt. *George Vancouver*, in 1798. Of British historians, besides Walsingham, Raleigh, the earl of Clarendon, Bishop Burnet, and Archbishop Usher, already named, *George Buchanan*, of Scotland, died in 1582; *Tobias Smollett*, in 1771; *David Hume*, in 1776; Dr. *William Robertson*, in 1793; *Edward Gibbon*, in 1794; *William Mitford*, in 1827; and Sir *James Mackintosh*, in 1832. Dr. John Lingard, Lord John Russell, Sharon Turner, Henry Hallam, and James Grahame, Esqrs., are, we believe, still living.

Of the British poets, *Geoffrey Chaucer* died in 1400; and *John Gower*, who wrote in Latin, died in 1402. Gascoigne died in 1577; Tusser, about 1580; and *Edmund Spenser*, in 1599. *William Shakspeare*, the dramatist, died in 1616; *John Fletcher*, in 1625; and *Ben Jonson*, in 1637. Davies died in 1626; Greville, (Lord Brooke), in 1628; Drayton, in 1631; Donne, in 1631; Carew, in 1639; Giles Fletcher, in 1623; and Phineas Fletcher, about 1650. *John Milton* died in 1674; Cowley, in 1667; Butler, in 1680; Waller, in 1687; and *John Dryden*, in 1700. Prior died in 1721; Gay, in 1732; Swift, in 1744; and *Alexander Pope*, in the same year. Thomson died in 1748; Collins, in 1756; Shenstone, in 1763; Dr. Young, in 1765; Akenside, in 1770; Falconer, in the same year; Gray, in 1771; Goldsmith, in 1774; and Dr. Armstrong, in 1779. *Robert Burns*, the Scotch poet, died in 1796; *William Cowper*, in 1800; James Beattie, in 1803; Grahame, in 1811; and Shelley, in 1822. *Lord Byron*, (George Gordon), died in 1824; Mrs. Barbauld, in 1825; Crabbe, in 1832; Sir *Walter Scott*, in the same year; Miss Hannah More, in 1833; Coleridge, in 1834; Mrs. Hemans, in 1835; and Miss Landon, (Mrs. Maclean), in 1838. Miss Baillie, Campbell, Rogers, Wordsworth, Bowles, Montgomery, Moore, Southey, and Prof. Wilson, are, we believe, still living. Of novelists and essayists, not already named, *Addison* died in 1719;

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fact in my … last day of the year 1857

Fielding, in 1754; Richardson, in 1761; Sterne, in 1768; and Dr. Johnson, in 1784. Mrs. Radcliffe died in 1822; and Galt, in 1839. Miss Burney, (D'Arblay), Miss Edgeworth, Mrs. Roche, and the Misses Porter, are also among the novelists. D'Israeli, Bulwer, James, Marryat, and Dickens, are still before the public.

Of British mathematicians, *Napier*, baron of Marchiston, died in 1617; *Hariot*, in 1621; Sir *Isaac Newton*, alike celebrated in natural philosophy, died in 1627; *Brook Taylor*, died in 1741; *Colin Maclaurin*, in 1746; and *Robert Simson*, in 1765. Of natural philosophers, besides Newton, *Roger Bacon*, (the friar), died in 1294; *Dr. Gilbert*, in 1603; *Francis Bacon*, (Lord Verulam), in 1626; *Robert Boyle*, in 1691; *Mitchell*, and Dr. *Gowan Knight*, flourished about 1740; Dr. *Joseph Black*, died in 1799; Dr. *Joseph Priestley*, in 1804; Dr. *William H. Wollaston*, in 1828; Sir *Humphrey Davy*, in 1829; and Sir *John Leslie*, in 1832. Of British astronomers, *John Flamstead*, died in 1719; Dr. *Edmund Halley*, in 1742; Dr. *James Bradley*, in 1762; Mr. Ferguson, in 1776; Dr. *Nevil Maskelyne*, in 1811; and Sir *William Herschell*, in 1822. Dr. *Henry*, the chemist, died in 1836. The philosophers and chemists, Brewster, Herschell, Dalton, Thompson, Ure, and Faraday, are, we believe, still living. Of British naturalists, and geologists, *John Ray*, died in 1705; *Thomas Burnet*, in 1715; *William Whiston*, in 1752; *James Hutton*, in 1797; Dr. *Erasmus Darwin*, in 1802; Professor *John Playfair*, in 1819; and Professor Robert Jameson, is, we believe, still living. Of British physicians and surgeons, Dr. *William Harvey*, died in 1658; Dr. *John Mayow*, in 1679; Dr. *Thomas Sydenham*, in 1689; Dr. *William Cheselden*, in 1752; Dr. *William Hunter*, in 1783; Dr. *John Brown*, in 1788; Dr. *William Cullen*, in 1790; Dr. *John Hunter*, in 1793; Dr. *John Mason Good*, in 1827; Dr. *Thomas Young*, in 1829; and Sir *Astley Paston Cooper*, in 1841. Sir Benjamin Brodie, Sir Charles Bell, and Dr. John Bell, are, we believe, still living.

Of British artists and inventors, *Edward Somerset*, marquis of Worcester, died in 1667; *Savary*, and *Newcomen* flourished in 1700; *James Watt*, died in 1819; Sir *Richard Arkwright*, died in 1792; *Hargreaves*, and *Crompton*, flourished in 1767 and 1779; Rev. *Edmund Cartwright*, died in 1824; and *John Harrison*, died in 1776. The engineers, *James Brindley*, died in 1772: *John Smeaton*, in 1792; *John Rennie*, in 1821; and *Thomas Telford*, in 1834. Of British architects, *Inigo Jones*, died in 1652; Sir *Christopher Wren*, in 1725; *James Stuart*, in 1788; and Sir *William Chambers*, in 1796. Of British painters, *William Hogarth*, died in 1764; Sir *Joshua Reynolds*, in 1792; *George Romney*, his rival, in 1802; Sir *Thomas Lawrence*, in 1830; *Richard Westall*, in 1836; and *David Wilkie*, we believe, is still living. Of sculptors, *John Flaxman* died in 1826; but *Francis Chantry* and *Richard Westmacott*, are still the ornament of their profession. Among the writers of music, Sir *John Hawkins*, died in 1789; and Dr. *Charles Burney*, in 1814.

§ 5. We come next to the *Biography of Central Europe;* commencing, as in the preceding departments, with Belgium, Holland, and Switzerland. Of Dutch statesmen and warriors, *William* I., prince of Orange, the originator of his country's independence, was assassinated, in 1584. His son, *Maurice*, of Nassau, prince of Orange, and the second stadtholder, died in 1625; by whom *Barneveldt*, the patriot, was put to death in 1619. *John de Witt*, the republican stadtholder, or pensionary, fell by the hands of a mob, in 1672. Admiral *Michael Fitz Adrian De Ruyter*, died in 1676; Admiral *Martin Harpertzoon Van Tromp*, fell in battle, in 1653; and his son, Admiral *Cornelius Van Tromp*, died in 1691. Under *William* IV., in 1747, and *William* V., in 1751, the stadtholdership was declared hereditary. Of Dutch jurists, we can only mention *Hugo Grotius*, who died in 1645; *Ulrich Huber*, who died in 1694; and *Zacharias Huber*, in 1731. Of Dutch divines, *Desiderius Erasmus*, died in 1536; *James Arminius*, in 1609; and *John Drusius*, in 1616. Of Dutch poets, *Van der Doos*, (or Douza), died in 1604; Heinse, in 1655; *Van Hooft*, also a historian, died in 1647; Cats, in 1660; Van der Goes, in 1687; Van der Vondel, in 1679; Rotgans, in 1710; Poot, in 1733; Van der Vliet, in 1780; and Nieuwland, in 1794.

Of Dutch mathematicians and natural philosophers, *Ludolph Van Ceulen*, died in 1610; *Gerard Mercator*, in 1594; *Nicolas Mercator*, in 1690; *Simon Stevin*, in 1635; and *Christopher Huygens*, in 1695. To this class belong also Albert Girard, and Zacharias Jansen. *Muschenbroek*, flourished in 1720; and *Leuwenhoek*, died in 1723. The chemists and physicians, *John Baptist van Helmont*, died in 1644; *Francis Sylvius*, in 1672; and *Hermann Boerhaave*, in 1738. Of Dutch, including Flemish painters, *Jean de Bruges*, (*Van Eyck*), flourished in 1410; *Peter Paul Rubens*, died in 1640; *Anthony Vandyck*, in 1641; *David Teniers*, the elder, in 1649; *Paul Potter*, in 1654; *Francis Snyders*, in 1657; and *Paul Rembrandt*, in 1668. Gaspar Crayer died in 1669; James Jordaens, in 1678; *Gerard Dow*, (Douw), a pupil of Rembrandt, died in 1680; and *Albert Cuyp*, (or Kuyp), flourished in 1690.

Of Swiss patriots and warriors, *William Tell*, died in 1354; and *Walter Fürst*, *Arnold of Melchthal*, and *Werner Stauffacher*, were his coadjutors, in achieving his country's independence. The brave *Arnold von Winkelried*, fell in the battle of Sempach, in 1386. Aloys Reding, and Hirzel of Zurich, were among the opponents of the French, in the time of Bonaparte. *Ulrich Zuinglius*, (or Zwingli), the Swiss reformer, fell in battle, in 1531. Of Swiss scholars, we would here mention, *Hottinger*, the philologist, who died in 1667; *Sulzer*, the metaphysician, who died in 1779; *Bonnet*, also a naturalist, who died in 1793; *Lavater*, the physiognomist, who died in 1801; and *Pestalozzi*, the pædagogist, who died in 1827. *John von Müller*, the historian, died in 1809: *John Charles Sismondi*, we believe, is still living. *Solomon Gesner*, (or Gessner), the poet, died in 1788. *Theophrastus Paracelsus*, the alchemist, died in 1541; and *Conrad Gesner*, the naturalist, died in 1565. *Albert von Haller*, the physician, died in 1777. *Hans Holbein*, the painter, died in 1554; and *Henry Fuseli*, in 1825. Several Swiss writers, in the French language, have been mentioned under French Biography.

We shall commence *German Biography*, including Austrian and

Prussian, by giving the following list of the later German emperors, with the dates of their accession. They are, *Rodolph*, of Hapsburg, 1273; Adolphus, of Nassau, 1291; Albert I., of Austria, 1298; Henry VII., of Luxemburgh, 1309; Lewis IV., the Bavarian, 1314; Charles IV., of Luxemburgh, 1347; Wenceslaus, 1378; Rupert, 1400; Sigismund, king of Hungary, 1410; *Albert* II., of Austria, 1438; Frederick III., 1440; Maximilian I., 1493; *Charles* V., 1519; Ferdinand I., 1558; Maximilian II., 1564; Rodolph II., 1576; Mathias, 1612; Ferdinand II., 1619; Ferdinand III., 1637; Leopold, 1658; Joseph, 1705; Charles VI., 1711; Charles VII., 1741; *Francis* I., 1745: Joseph II., 1765; Leopold II., 1790; and Francis II., 1792; who, in 1804, assumed the title of Emperor of Austria, as already mentioned, (p. 229). The *kings of Prussia*, are Frederick I., 1701; Frederick William I., 1713: *Frederick* II., the Great, 1740: Frederick William II., 1786: and Frederick William III., 1797.

Of German statesmen and warriors, *Berengarius*, duke of Friuli, and rival of Arnold, flourished in 888: *Philip*, duke of Swabia, and rival of Otho of Saxony, was assassinated in 1208: and *Frederick*, of Austria, the rival of Lewis of Bavaria, flourished in 1330: *John Zisca*, the formidable general of the Hussites, died in 1424: and *John Corvinus Hunniades*, defender of Hungary against the Turks, died in 1456. *Frederick*, the Wise, elector of Saxony, and the friend of Martin Luther, died in 1526: and his nephew, *John Frederick*, who headed the league of Smalcalden, died in 1554. John Tzerklas, count of *Tilly*, general of the Catholic League, died in 1632: and *Albert Wallenstein*, his predecessor, was assassinated, in 1634. Prince *Raymond Montecuculi*, the imperial general against Turenne and Condé, died in 1680. Prince *Francis Eugene*, of Savoy, coadjutor of the duke of Marlborough, died in 1736. Marshal *Maurice of Saxe*, who served against the Turks, and in the armies of France, died in 1750. Count *Leopold Joseph Daun*, the Austrian general, opposed to Frederick the Great, died in 1766. *Paul de Werner*, a Prussian general, died in 1785: and Marshal *Lebrecht von Blucher*, died in 1819. Prince *Schwartzenberg*, the Austrian field marshal, died in 1820: but Prince *Metternich*, is, we believe, still living.

Of German divines, *John Huss*, the reformer, was burnt by Sigismund, in 1415: and *Jerome, of Prague*, his friend, shared his fate, in 1416. *Thomas a Kempis*, the pious, died in 1471. *John Œcolampadius*, the reformer, died in 1531: and *Philip Melanchthon*, the friend of Luther, died in 1560. *Martin Luther*, the great reformer, died in 1546. *Johann Lorenz Mosheim*, the ecclesiastical historian, died in 1755. *John Augustus Ernesti*, the theological critic, died in 1781: and *Henry Gottlob Tschirner*, the eloquent preacher, died in 1828. Of metaphysical philosophers, *Jacob Böhme*, (or Bœhmen), died in 1624: *Christian von Wolff*, (or Wolfius), died in 1754: and *Immanuel Kant*, of Prussia, died in 1804. Of jurists, besides Wolff, we would mention Baron *Samuel von Puffendorf*, who died in 1694.

Of German geographers, *J. G. Hassel*, the most celebrated, died in 1829. *Martin Behaim* (or Behem) died at Lisbon, in 1506. Of German historians, *Einard Eginhard*, secretary to Charlemagne, died in 839; and *Otto von Freysingen* was the grandson of Frederick Barbarossa. *Ottocar of Horneck,* who wrote in the German language, flourished in 1300; and Turmayr, (Aventinus), and Franke, were among the early historians. John Christopher Frederick von *Schiller,* also a poet, died in 1805; and Berthold George *Niebuhr* died in 1831. John Godfrey von *Herder,* the critic and poet, died in 1803; and Frederick von *Schlegel,* also an historian, died in 1829. His brother, Augustus William Schlegel, we believe is still living.

Of the German poets, besides Schiller and Herder, *Henry of Valdeck,* the first of the minnesingers, flourished in 1180: and the rivals, *Henry of Ofterdingen* and *Wolkram of Eschenbach,* flourished about 1200. Of the mastersingers, *Hans Folz* and *Hans Sachs,* flourished about 1450. *Martin Opitz,* (or Opitius), the Silesian, died in 1639; *Paul Fleming,* in 1640; and *Paul Gerhard,* in 1676. Ewald Christian of *Kleist,* died in 1759; *Frederick Hagedorn,* in 1754; John Christopher von *Gottsched,* in 1762; Christian Frederick *Gellert,* in 1769; Gotthold Ephraim *Lessing,* in 1781; and Gottfried Augustus *Bürger,* died in 1794. Frederick Gottlieb *Klopstock* died in 1803; Christopher Martin *Wieland,* and Theodore *Körner,* in 1813; Count Frederick Leopold *Stolberg,* and Augustus von *Kotzebue,* in 1819; John Henry *Voss,* in 1826; and John Wolfgang von *Goethe,* died in 1832. Winkelman, Tieck, and Tiedge are, we believe, still living. Of German novelists, *Meissner* died in 1807; *Nicolai,* in 1811; and John Paul *Richter* died in 1825.

Of German mathematicians and natural philosophers, Gottfried Wilhelm, baron of *Leibnitz,* died in 1716; and Leonard *Euler,* of Swiss birth, died at St. Petersburg, in 1783. John Müller, called *Regiomontanus,* died in 1476; Athanasius *Kircher,* in 1680; Otho von *Guericke,* in 1686; Ehrenfried Walter von *Tschirnhausen,* about 1690; James *Herman,* in 1733; Gabriel Daniel *Fahrenheit,* in 1736; John *Ingenhouz,* in 1799; and Joseph von *Fraunhofer,* died in 1826. Of the astronomers, John *Bayer* flourished in 1603; John *Kepler* died in 1630; Tobias *Mayer,* in 1762; Prof. *Harding,* in 1834; and Dr. *Olbers* died in 1840. Of the alchemists, *Albertus Magnus* died in 1280; *Basil Valentine* flourished about 1420; George *Agricola,* in 1530; and Nicholas Sebastian *Brandt,* flourished in 1669. John Joachim *Becher* died in 1685; William *Homberg,* in 1715; and George Ernest *Stahl,* in 1734. Of mineralogists and geologists, *Lehman,* the miner, flourished in 1756; Abraham Gottlob *Werner* died in 1817; and Frederick *Mohs* died in 1839. Of naturalists, Joachim *Junge* died in 1657; John George *Gmelin,* in 1755; Charles Louis *Willdenow,* in 1812; and Baron Alexander *Humboldt,* we believe, is still living.

Of German physicians, Dr. Maurice *Hoffman,* died in 1698; and Dr. Frederick *Hoffman,* in 1742. John Frederick *Blumenbach,* the celebrated physiologist, died in 1840. *Hildanus* was a physician of note; and Dr. Samuel Hahneman, the homœopathist, is, we believe, still living. Engelbert *Kämpfer,* celebrated also as a traveller, died in 1716. Of German painters, Martin *Schoen* (or Schoenbauer) died in 1486; Michael *Wohlgemuth,* in

1519; Lucas *Kranach*, in 1553; and Sir Godfrey *Kneller*, in 1723. Cornelius, and the sculptors, Tieck, and Rauch, are, we believe, still living. Of musical composers, *Handel* died in 1759; *Mozart*, in 1792; *Haydn*, in 1809; *Weber*, in 1826; and *Beethoven*, in 1827.

Under *Danish Biography*, we have room to give the sovereigns of Denmark, only since its union with Norway and Sweden, in 1438. They are *Christopher* III., 1438; Christian I., 1448; John I., 1481; Christian II., 1513; Frederick I., 1522; Christian III., 1533; Frederick II., 1559; Christian IV., 1588; Frederick III., 1648; Christian V., 1670; Frederick IV., 1699; Christian VI., 1730; Frederick V., 1746; Christian VII., 1766; Frederick VI., 1808; and Christian VIII., 1839. Count *Struensee*, the minister of Christian VII., was beheaded in 1772: the elder count *Bernstorff* died in the same year; and the younger, in 1797. Of Danish historians, Sueno (or Svend *Aageson*, flourished in 1188; and *Saxo-Grammaticus*, (Lang of Schonen), died in 1204. *Wielandt* died in 1730; *Sneedorf*, in 1764; and *Suhm*, in 1799. Of literati, Charles B. *Tullin* died in 1765; and Baron Louis of *Holberg*, of Norwegian birth, in 1754. Of Danish poets, Arreboe died in 1637; Bording, in 1677; Schestedt, in 1698; Kingo, in 1703; Lorterap, in 1722; Ewald, in 1781; Wessel, in 1786; Weyer, in 1788: Falsen, in 1808; and Baggesen, in 1826. *Œhlenschläger*, the poet and novelist, is, we believe, still living. *Tycho Brahe*, the astronomer, died in 1601; and *Longomontanus*, his pupil, in 1647. *Olaf Worm*, (or Wormius), the mineralogist, died in 1654. Professor *Oersted*, is, we believe, still living; as also *Thorwaldsen*, the sculptor.

§ 6. We shall commence *Swedish Biography*, with the names and dates of accession of the Swedish sovereigns, since the last union with Denmark. They are *Gustavus* I., Vasa, 1523; Eric XIV., 1560; John III., 1568; *Sigismund*, king of Poland, 1592; Charles IX., 1598; *Gustavus* II. Adolphus, 1612; Christina, 1632; Charles X., 1654; Charles XI., 1660; Charles XII., 1696; Frederick and Ulrica, 1718; Adolphus Frederick, 1751: Gustavus III., 1771; Gustavus IV., 1792; Charles XIII., 1809; and *Charles* XIV., (John Bernadotte), in 1818. General *John Banier*, (Baner, or Banner), died in 1641; and General *Leonard Torstenson*, died in 1651. The chancellor, Axel of *Oxenstiern*, minister of Gustavus Adolphus, died in 1654. *Snorro Sturlason*, the Icelandic historian, died in 1241; and *Eric Pontoppidan*, bishop of Bergen, died in 1764. *Erik Olafsen*, the Swedish chronicler, flourished in 1490; and Eric Gustavus Geyer, (Geijer), is a Swedish historian of the present day. *Emanuel Swedenborg*, founder of a new religious sect, died in London, in 1772. Of Swedish poets, Olaus or Olof Dalin, died in 1763; Madame Nordenflycht, in the same year; Lidner, in 1793; Charles M. Bellman, in 1795; and Gyllenborg, in 1808. Atterbom and Ling, are, we believe, still living. Among the Swedish novelists are Mörk, and Livijus. Of the Swedish chemists, *Bergmann* died in 1784; *Scheele*, in 1786; and *Berzelius* is still living. *Charles Linnæus*, (Linné), the naturalist, died in 1778; *Artedi*, his friend, the zoologist, died in 1735; and Dr. *Olaus Rudbeck*, the elder, died in 1702.

Under *Polish Biography*, we would mention the last kings of Poland; Alexander, in 1501; Sigismund I., 1507; Sigismund II., Augustus, 1548; Henry of Anjou, 1573; Stephen Balore, 1576; Sigismund III., 1587; Vladislaus VI., 1632; John II., Casimir, 1648; Michael, 1669; John III., Sobieski, 1674; Augustus II., 1697; Frederick Augustus, 1734; and Stanislaus Poniatowski, 1764; who was dethroned on the dismemberment of Poland. *Thaddeus Kosciusko*, the Polish patriot, died in 1817, in Switzerland; and Count Joseph *Pulaski*, (or Pulawski), who also aided the United States, fell at Savannah, in 1779. Of Polish historians, *Duglosa* died in 1480; and *Naruszewicz*, also a statesman and poet, died in 1796. *Stryikowski*, and *Kobierzyzki*, are also Polish historians. Of Polish poets, Kochanowski died in 1584; Krasicki, in 1802; Trembecki, in 1812; and Karpinski, in 1820. *Nicholas Copernicus* of Thorn, the Polish astronomer, died in 1543.

Under *Russian Biography*, we have room to mention only the more recent sovereigns, since Russia became a prominent empire. They are *Peter*, the Great, sole monarch, in 1696; *Catherine* I., 1725; Peter II., 1727; Anne, 1730; Ivan (or John) III., 1740; Elizabeth, 1741; Peter III., 1762; *Catherine* II., same year; Paul, 1796; *Alexander*, 1801; and Nicholas, 1825. Prince Gregory Alexandrowitsch *Potemkin*, the favorite and minister of Catharine II., died in 1791. Count Peter Alexandrowitsch *Romanzoff* died in 1796; Count *Suwaroff-Rimnitzkoy*, (or Suwarrow), who defeated the Turks, and opposed the French in Italy, died in 1800; and Field Marshal *Kutusoff*, died in 1813. *Krusenstern*, the circumnavigator, is, we believe, still living. Nicholas *Karamsin*, the historian, died in 1826. Of the Russian poets, Michael Wasilowitz *Lomonosoff* died in 1765; and Gabriel Romanowich *Derschawin*, died in 1819. Oseroff and Cheraskoff, are also poets of note. Professor Peterman Simon *Pallas*, the naturalist, of German birth, died in 1811.

CHAPTER IV.

AMERICAN BIOGRAPHY.

On the subject of American Biography, we feel it a duty to be more full than in the preceding branches, so far as we have the means of being so: though unfortunately the records of Spanish America are so imperfect as to present us with only a skeleton of that division of the present branch. Under American Biography, will properly be included the names of many persons born in Europe; but who came to this continent at an early period, or here acquired distinction. The Biography of citizens of the United States, being to us much the most important, will naturally occupy a large portion of our allotted space; especially as our own country has produced a large portion of all the Americans who have yet acquired distinction, in the various pursuits of life.

§ 1. We shall commence the section on United States Biography, by giving the names of our early statesmen, not celebrated as warriors. *John Winthrop*, historian, and governor of Massachusetts, died in 1649; *John Winthrop*, governor of Connecticut, died in 1676; and *Roger Williams*, governor of Rhode Island, died in 1683. Lord *Delaware*, governor of Virginia, died in 1618; and *Leonard Calvert*, first governor of Maryland, died in 1676. *William Penn*, the first governor of Pennsylvania, died in 1718; *William Burnet*, governor of New York, and afterwards of Massachusetts, died in 1729; *James Logan*, governor of Pennsylvania, died in 1751; and *Thomas Hutchinson*, historian, and governor of Massachusetts, died in 1780. Of military men, in the Indian and French wars, Capt. *John Smith*, historian, and president of Virginia, died in 1631; Capt. *John Mason*, of Connecticut, leader in the Pequot war, died in 1673; Capt. *Miles Standish*, of Plymouth, in 1656; Capt. *Daniel Henchman*, of Massachusetts, celebrated in King Philip's war, died in 1675; and Capt. *Samuel Wadsworth*, of Massachusetts, was slain in 1676. General *William Phipps*, of Massachusetts, died in 1695; General *William Pepperell*, of Massachusetts, in 1759; General *William Shirley*, governor of Massachusetts, died in 1771; and General *William Johnson*, of New York, died in 1774.

Of the statesmen of the Revolution, *Peyton Randolph*, of Virginia, first president of the Continental Congress, died in 1775; *John Hancock*, of Massachusetts, its second president, died in 1793; *Henry Laurens*, of South Carolina, its third president, died in 1792; and *John Jay*, of New York, its fourth president, who was afterwards first chief justice of the United States, died in 1829. Of the remaining presidents of that Congress, *Samuel Huntington*, of Connecticut, died in 1796; *Thomas M'Kean*, of Pennsylvania, in 1817; *John Hanson*, of Maryland, in 1783; *Elias Boudinot*, of Pennsylvania, in 1821; *Thomas Mifflin*, of Pennsylvania, in 1800; *Richard Henry Lee*, the orator, of Virginia, in 1794; *Nathaniel Gorham*, of Massachusetts, in 1796; *Arthur St. Clair*, of Pennsylvania, in 1818; and *Cyrus Griffin*, of Pennsylvania, died in 1810. *Josiah Quincy*, the orator, of Massachusetts, died in 1775: and *James Otis*, another patriot and orator, of Massachusetts, died in 1783. *Benjamin Franklin*, the patriot and philosopher, died in 1790. *Patrick Henry*, the orator, and governor of Virginia, died in 1799. *Samuel Adams*, of Massachusetts, and *Edmund Pendleton*, of Virginia, died in 1803; *Arthur Middleton*, of South Carolina, in 1787; and *Edward Rutledge*, of South Carolina, in 1800. *Fisher Ames*, the orator, of Connecticut, died in 1808; *Robert R. Livingston*, of New York, died in 1813; and *Edmund Randolph*, of Virginia, in the same year. *Robert Morris*, of Pennsylvania, the financier, died in 1806. *John Adams*, of Massachusetts, second president of the United States; and *Thomas Jefferson*, of Virginia, the third president, both died July 4, 1826. *Oliver Ellsworth*, of Connecticut, the second chief justice of the United States, died in 1807; and *George Clinton*, of New York, vice president of the United States, after Adams, Jefferson, and Burr, died in 1812. *John Marshall*, of Virginia, the historian, and third chief justice of the United States, died in 1836.

Of statesmen of the Revolution who were also distinguished in arms, GEORGE WASHINGTON, of Virginia, commander-in-chief of the Revolutionary armies, and first president of the United States, was born February 22, 1732; and died December 14, 1799. General *Alexander Hamilton*, of New York, fell in a duel, in 1804; and Colonel *Aaron Burr*, his antagonist, died in 1836. General *William Moultrie*, of South Carolina, also an historian, died in 1805. Colonel *Timothy Pickering*, of Massachusetts, died in 1829; and *Charles C. Pinckney*, of South Carolina, in 1825. Of other general officers of the Revolution, General *Joseph Warren*, of Massachusetts, fell at Bunker's Hill, in 1775; and General *Richard Montgomery*, of New York, fell at Quebec, in the same year. General *Hugh Mercer*, of Pennsylvania, fell at Princeton, in 1777. General *Israel Putnam*, of Connecticut, died in 1790; General *Nathaniel Greene*, of Rhode Island, in 1786; General *Benjamin Lincoln*, of Massachusetts, in 1810; General *Henry Knox*, of Massachusetts, in 1806; General *John Stark*, of New Hampshire, in 1822; General *Ethan Allen*, of Vermont, in 1789; General *Philip Schuyler*, of New York, in 1804; General *Horatio Gates*, of New York, in 1806; General *James Clinton*, of New York, in 1812; General *Anthony Wayne*, of Pennsylvania, in 1796; General *Otho H. Williams*, of Maryland, in 1794; General *Charles Lee*, of Virginia, in 1782; General *Daniel Morgan*, of Virginia, in 1799; General *Francis Marion*, of South Carolina, in 1795; and General *Thomas Sumter*, of South Carolina, died in 1832. Of foreign officers who assisted our country, besides La Fayette, Kosciusko and Pulaski, already mentioned, Baron *De Kalb*, of Germany, was slain near Camden, in 1780; and Baron *Steuben*, of Prussia, died in 1794. Capt. *Nicholas Biddle*, of the Continental Navy, fell in 1778; and Capt. *John Paul Jones*, died in 1792.

Of officers distinguished in the war of 1812, we would first name General *Zebulon M. Pike*, of New Jersey, who fell at York in Canada, in 1813. General *Henry Dearborn*, of Massachusetts, died in 1829; General *Thomas Pinckney*, of South Carolina, in 1828; General *Jacob Brown*, of New York, in 1828; General *James Wilkinson*, of Maryland, in 1825; General *James Winchester*, of Tennessee, in 1826; General *William H. Winder*, of Maryland, in 1824; General *John Stricker*, of Maryland, in 1825; General *George Izard*, of South Carolina, in 1823; General *Eleazer W. Ripley*, of New Hampshire, in 1839; General *Wade Hampton*, of South Carolina, in 1835; and General *Stephen Van Rensselaer*, died in 1839. Generals Jackson, Porter, Macomb, Gaines, and Scott, are, we believe, still living. Of distinguished naval officers, in the war of 1812, Captain *James Lawrence* was slain in 1813; Captain *William Burrows*, and Captain *William H. Allen*, fell in the same year; Commodore *William Bainbridge*, died in 1833; Commodore *Stephen Decatur*, in 1820; Commodore *Oliver H. Perry*, in 1820; Commodore *Thomas McDonough*, in 1825; Commodore *Joshua Barney*, in 1818; and Commodore *John Rogers* died in 1838. The names of Barron, Stewart, Hull, Chauncey, Jones, Morris, and Warrington, now stand at the head of the list of the United States navy.

Of statesmen since the times of the Revolution, *James Madison*, of Virginia, the fourth president of the United States, died in 1836; and *Elbridge Gerry*, his associate, as vice president, died in 1814. *James Monroe*, of Virginia, the fifth president, died in 1831; and *Daniel D. Tompkins*, of New York, his associate, as vice president, died in 1825. General *William Henry Harrison*, distinguished in the war of 1812, died in 1841; one month after his inauguration, as the ninth president of the United States. *De Witt Clinton*, of New York, died in 1828; *William H. Crawford*, of Georgia, in 1834; and *Robert Y. Hayne*, of South Carolina, in 1839. *James A. Bayard*, of Delaware, died in 1815; *Gouverneur Morris*, of New York, in 1816; *Caleb Strong*, of Massachusetts, in 1820; *George Cabot*, of Massachusetts, in 1823; and *Brockholst Livingston*, of New York, in the same year.

Of United States lawyers, not yet mentioned, *George Wythe*, of Virginia, died in 1806; *John Rutledge*, of South Carolina, in 1800; *Bushrod Washington*, of Virginia, in 1829; *William Cushing*, of Massachusetts, in 1810; *Alexander J. Dallas*, of Pennsylvania, in 1817; *Nathan Dane*, of Massachusetts, in 1835; *Thomas Addis Emmett*, of New York, in 1827; *Alexander C. Hanson*, of Maryland, in 1806; *Francis Hopkinson*, of Pennsylvania, in 1791; *Levi Lincoln*, of Massachusetts, in 1820; *William Paca*, of Maryland, in 1799; *Tapping Reeve*, of Connecticut, in 1823: *James Wilson*, of Pennsylvania, in 1798; and *William Wirt*, of Pennsylvania, died in 1834.

Of United States divines, Rev. *John Harvard*, of Massachusetts, died in 1638; Rev. *John Elliot*, missionary to the Indians, died in 1690; Rev. *Cotton Mather*, of Massachusetts, died in 1728; and Rev. *David Brainerd*, missionary to the Indians, died in 1747. Rev. President *Jonathan Edwards*, the elder, of Princeton College, died in 1758; Rev. President *Samuel Johnson*, of King's, now Columbia College, died in 1772; Rev. *Charles Chauncy*, of Massachusetts, died in 1787; Rev. *Jeremy Belknap*, historian, of New Hampshire, died in 1798; Rev. President *Jonathan Edwards*, the younger, of Union College, died in 1801; Rev. *Samuel Hopkins*, of Connecticut, founder of a religious sect, died in 1803; and Rev. President *Timothy Dwight*, of Yale College, died in 1817. Rev. President *Eleazer Wheelock*, of Dartmouth College, died in 1799; Rev. *Joseph Bellamy*, of Connecticut, died in 1790; and Rev. *John Blair Linn*, also a poet, died in 1804. Rev. *Jedediah Morse*, of Connecticut, the geographer, died in 1827. Bishop *Samuel Seabury*, of Connecticut, died in 1796; Bishop *Benjamin Moore*, of New York, in 1816; Bishop *John H. Hobart*, of New York, in 1830; and Rt. Rev. *William White*, senior bishop of the Protestant Episcopal Church, died in Philadelphia in 1836.

Of United States travellers, besides Captain Smith, General Pike, and President Dwight, already mentioned, *John Ledyard*, of Connecticut, died in 1789; *Jonathan Carver*, of Connecticut, died in 1780; *Meriwether Lewis*, of Louisiana, died in 1809; and *William Clark*, of Louisiana, died in 1838. Of United States historians, not yet named, *William Smith*, of New York, flourished in 1757; *Samuel Smith*, of New Jersey, died in 1776;

George R. Minot, of Massachusetts, in 1802; *William Gordon*, of Massachusetts, in 1807; Dr. *David Ramsay*, of South Carolina, in 1815; and *Samuel Williams*, of Vermont, died in 1817. Rev. *Abiel Holmes*, of Massachusetts, the annalist, died in 1837. Of United States poets, *Joel Barlow*, of Connecticut, died in 1812; Colonel *David Humphreys*, of Connecticut, in 1818; and *John Trumbull*, of Connecticut, died at Detroit, in 1831. *Robert Treat Paine*, of Massachusetts, the second of that name, died in 1811. *Charles Brockden Brown*, of Pennsylvania, the novelist, died in 1809. Many of our distinguished poets and novelists are still living; some of whom will be referred to in our next department.

Among the scientific men whom our country has produced, besides the immortal Franklin, Professor *John Winthrop*, of Massachusetts, the astronomer, died in 1779; *David Rittenhouse*, of Pennsylvania, died in 1796; Rev. President *John Ewing*, of Pennsylvania, died in 1802; Rev. President *Samuel Webber*, of Massachusetts, died in 1810; Professor *Alexander M. Fisher*, of Yale College, was lost at sea in 1822; and Dr. *Nathaniel Bowditch*, of Massachusetts, died in 1838. Of American naturalists, *John Bartram*, of Pennsylvania, died in 1777; *Alexander Wilson*, of Pennsylvania, in 1813; Dr. *Benjamin S. Barton*, of Pennsylvania, in 1815; *William Bartram*, of Pennsylvania, died in 1823; Dr. *John Godman*, of Pennsylvania, died in 1830; and Dr. *Samuel L. Mitchell*, of New York, died in 1831. Of other distinguished physicians of the United States, Dr. *Zabdiel Boylston*, of Massachusetts, died in 1766; Dr. *John Morgan*, of Pennsylvania, in 1789; Dr. *William Bull*, of South Carolina, in 1791; Dr. *John Redman* and Dr. *William Shippen*, of Pennsylvania, in 1808; Dr. *Benjamin Rush*, of Pennsylvania, in 1813; Dr. *Caspar Wistar*, of Pennsylvania, in 1818; Dr. *Samuel Bard*, of New York, in 1821; Dr. *David Hosack*, of New York, in 1835; and Dr. *Philip Sing Physick*, of Pennsylvania, died in 1837.

In the useful, as well as the fine arts, our country has contributed its share of distinguished names. *Thomas Godfrey*, of Pennsylvania, inventor of the quadrant, died in 1746. *Robert Fulton*, of New York, the first successful inventor of the steamboat, died in 1815; and *Oliver Evans*, of Pennsylvania, the pioneer in this invention, died in 1819. *Eli Whitney*, of Massachusetts, inventor of the cotton gin, died in 1825. Of distinguished painters, *Edward G. Malbone*, of Rhode Island, died in 1807; *John Singleton Copley*, of Massachusetts, died in 1815; *Benjamin West*, of Pennsylvania, afterwards president of the English Royal Academy, died in 1820; *Charles Wilson Peale*, of Pennsylvania, also a naturalist, and founder of the first American Museum, died in 1827; and *Gilbert Stuart*, of Rhode Island, died in 1828. The numerous distinguished names of men who still adorn our country, in literature, science, and the arts, we here forbear to repeat.

§ 2. Our sketch of the Biography of Spanish and Portuguese America, will necessarily be very brief and imperfect. *Fernando Cortez*, the conqueror of Mexico, died neglected, in Spain, in 1554. *Iturrigaray*, and after him *Venegas*, were the last Spanish viceroys, before Mexico became independent. The priest *Hidalgo*, who favored the revolution, was put to death in 1811; and his coadjutor, *Morelos*, was shot in 1815. General *Xavier Mina*, another patriot, was shot in 1817. *Augustin Iturbide*, sometime emperor of Mexico, was shot in 1824. The successive presidents of Mexico, have been, Fernandez Guadaloupe *Victoria*, (or Vittoria), in 1825; Vincente *Guerrero*, in 1829; Antonio Lopez de *Santa Anna*, in 1833; and Anastasio *Bustamente*, in 1837. Among other political characters in Mexico, we would simply name Nicholas *Bravo*, the first vice president, and Negrete, and Pedrazas. In Central America, the succession of presidents, has been, Manuel José *Arce*, in 1825; and Francisco *Morazan*, in 1830; who has since been re-elected. Among other statesmen of Central America, are, Beltranena, Barrundia, Prado, Salazar, and Virgil, all of whom have held the office of vice president, in the succession above named. (p. 238.) *Inez de la Cruz*, was a Mexican nun, and poet of the 18th century.

The monarchs of Brazil, since it became a distinct kingdom, are, *John* VI. of Portugal, in 1815; Don *Pedro* I., the first independent emperor, in 1822; and *Pedro* II., in 1831. Among the statesmen of Brazil, are the brothers Andrade; also Bonifacio, Ribeiro, Campos, Da Gama, Mello, and others. Among the Brazilian commanders, were admiral Lord *Cochrane*, now the Scotch earl of Dundonald; and generals Lima, and Brandt. The minister, Conde da Barca, is named as a patron of science. Manoel Ayres de *Cazal*, is a Brazilian historian; and we may mention as Brazilian poets, Claude Manoel da *Costa*, (or Corta); Andre Nunes de *Silva;* and Antonio Diniz da *Cruz e Silva*, who flourished in 1807.

Ojeda and *Nicuessa*, to whom New Grenada was first granted, flourished in 1508. *Pedro Arias de Avila*, and *Quesada* and *Benalcazar* were their successors in the conquest of this region. General *Francisco Miranda*, of Caraccas, who first attempted to liberate his country from the Spanish dominion, died in prison, in 1814, at Cadiz, in Spain. General *Simon Bolivar*, the first president of the temporary republic of Colombia, died in 1830. General Francisco de Paula *Santander*, its first vice president, was elected, in 1832, president of New Grenada, but died in 1840; and Joachim *Mosquera*, elected president of Colombia in 1830, has since been vice president of New Grenada; of which latter republic José Ignacio de *Marquez* became president in 1836. Among other patriots of New Grenada, we would name Urdanata, General Caicedo, and General *Sucre*, the victor at Pichincha, and Ayachuco, who was assassinated in 1830. General José Antonio *Paez* was elected president of Venezuela, in 1831; Dr. *Vargas*, in 1835; and General *Paez* was re-elected in 1839. *Navarreto* was its first president. Vincente *Rocafuerte* succeeded General Flores, we believe in 1838, as president of Equador, or Equator.

Of *Peruvian Biography*, *Francisco Pizarro*, the conqueror of Peru, was assassinated at Lima, in 1541; *Diego Almagro*, his associate, having been put to death in 1537, by Ferdinand Pizarro, brother of Francisco. General José de *San Martin*, the liberator of Peru, was declared its first president, or protector,. in 1821; and General *José La Mar*, elected president in 1822, was superseded by

Bolivar; but re-elected in 1827. He was deposed by La Fuente; and General *Gamarra* succeeded as president in 1829; but he was succeeded by *Obregoso*, in 1833. General *Sucre*, of Venezuela, was elected president of Bolivia, or upper Peru, in 1826: General *Velasco* succeeded him, in 1828; General *Blanco*, elected soon after, was assassinated in 1829; and General *Santa Cruz* was elected president in 1829; as we have already mentioned in the preceding department. (p. 240). Among the royalist generals, opposed to the revolution in Peru, were La Serna, Valdez, Canterac, Rodil, and Olaneta. Torretagle first joined the republicans, but afterwards united with the Spanish forces.

Of Chili, *Pedro de Valdivia*, the first conqueror, was defeated by the Araucanians, in 1553; *Joseph Manto* was the governor in 1742; and *Antonio Gonzago*, in 1770. *Rodriguez* and the three *Carreras*, were murdered, at the instigation of San Martin, in or about 1817. *Bernardo O'Higgins* became the first supreme director, in 1817: General *Ramon Freire* succeeded him in 1823; and Admiral *Manuel Blanco*, in 1826. Don *José Maria Benevente* was elected president in 1827; and General *Joaquin Prieto*, in 1831. The successive vice presidents have been *Pinto*, in 1827; *Vicuña*, in 1829; and *Portales*, in 1831, who was assassinated in 1838.

Of *La Plata*, or Buenos Ayres, *Pedro de Mendoza*, the first colonizer, flourished in 1553. Since the revolution in La Plata, the successive heads of the government have been, *Liniers*, the Frenchman, in 1810; *Cisneros*, in 1811, superseded the same year by a triumvirate; *Pozadas*, in 1814, as supreme director; *Pueyrredon*, in 1816; *Rondeau*, in 1819; *Rivadavia*, in 1826; *Dorrego*, in Buenos Ayres, in 1827, who was shot, and superseded by General *Lavalle*, head of the federalists or Unitarios, in 1828; General Juan José *Viamont*, in 1829; General Juan Manuel de *Rosas*, in the same year; General *Quiroga*, in 1830; General Ramon de *Balcarce*, in 1833; General *Viamont*, again in 1834; and General *Rosas*, again in 1835. General *Fructuoso Ribeira*, (or Rivera), was elected president of Uruguay, in 1833; General *Oribe*, in 1835; and the former was re-elected in 1836.

VIII. DEPARTMENT:

CALLOGRAPHY.

In the department of Callography, we comprehend a wide range of entertaining and miscellaneous literature; particularly Poetry and the Drama; Romances, Novels, Tales and Fables; Essays and Letters; and Orations, Addresses, and Speeches, not strictly belonging to the other departments. The name is derived from the Greek καλος, beautiful, or καλλος, beauty; and γραφω, I write, or γραφη, a description. It corresponds nearly to the term Polite Letters; which is nearly synonymous with the French term Belles Lettres: but both of these terms are generally used in a more extensive, though rather vague signification. The French have several works giving general views of this department; among which we may mention those of Le Batteaux, La Harpe, and the Countess D'Hautpoul, under the title of *Cours de Littérature*, or Course of Literature. All that we can here attempt, in this department, will be a brief allusion to some of the best works, as far as we are able to discriminate. Works of this class are prominent subjects of criticism; though the latter term, as already explained, is correlative with the whole extent of human knowledge. (p. 37).

The study of Callography, unfolds, to some extent, what has been termed a knowledge of the world, that is of mankind, their characters, passions, and principles of action. At the same time, it requires a considerable portion of such knowledge, in order to be understood and appreciated. It may also aid in storing the mind with grand and beautiful ideas; in warming the heart with noble sentiments; and in giving vivid impressions of scenes and events, which embody, as it were, the spirit of distant nations and past ages. While such results may be derived from the best Callographic Writings, it must be confessed that other works of this class abound in feeble, false, or unworthy sentiments and ideas; such as tend to enervate both the memory and the reasoning powers, and to unfit the mind for the active duties of life. Some of them are purposely designed to corrupt the heart, and poison the fountains of all virtue; either openly, or by the most artful and alluring disguise; and such works have been ruinous to many victims, by stimulating their passions, or sanctioning their crimes. Even the best works of imagination, we think, should be regarded as a luxury, and read only in leisure hours, for relaxation and amusement: but the indiscriminate and unrestrained perusal of inferior works of this class, is fatal to intellectual vigor, and to the pursuit of exact and useful knowledge.

The progress of Callography, has generally been concurrent with that of the other branches of literature; though in early times the poetic age appears to have preceded the scientific. The world has witnessed four remarkable periods when Literature especially flourished, anterior to our own times. They are, 1. The *Grecian age*, from the times of Pericles to those of Alexander the Great; 2. The *Roman age*, in the days of Julius and Augustus Cæsar; 3. The *Romantic age*, or times of Leo X. in Italy, Francis I. in France, and Elizabeth in England, sometimes called the Italian or Elizabethan age; and 4. The *Gallant age*, or times of Louis XIV. and Queen Anne, in which German Literature first began to excite general attention. Chateaubriand remarks that Homer, Dante, Rabelais, and Shakspeare, are the four great fountains, from which all other writers have more or less derived their subjects, and imbibed their ideas; a remark which, though quite ingenious, is true only to a very limited extent.

Poetry, so named from the Greek ποιησις, is the language of feeling and imagination: and its proper subjects are the sublime and the beautiful, in nature and morals;—including the human affections in general, but especially those which most attach us to our Creator and our fellow men;—religion, patriotism, friendship, and love. In a technical sense, Poetry is understood to be any composition formed in regular verses or stanzas; although many highly poetical compositions are in the form of prose. A *verse*, is a single line of poetry, of determinate length; so called from the Latin *verto*, I turn, because we turn back from it to the next line. A *stanza*, signifies several lines, completing the poetic measure, and ending in a pause. The word is Italian, but derived from the Latin *stans*, standing or stopping. The distinction between rhyme and blank verse, with the common poetic feet, has been already explained, in the branch of General Grammar. (p. 48).

Epic or heroic poetry, has for its subject the exploits of some hero, or heroes, of national celebrity. The plot, action, or fable of an epic poem, is sometimes called an *epopeia;* and should possess the requisite unity and interest: this being regarded as the highest kind of poetry. *Lyric* poetry, is that kind which is designed to be set to music; as psalms, hymns, odes, and songs: and it was originally accompanied, when sung, with the lyre or harp; whence it derives its name. *Odes*, have been classed as sacred, heroic, moral or philosophical, and festive, or amorous. *Elegiac* poetry, is that employed for solemn purposes, or on mournful occasions; as in *elegies* on deceased friends. *Epitaphs*, or inscriptions on tombstones, are often elegiac in their character. *Pastoral* poetry, is such as would be appropriate to shepherds, treating of rural affairs and the social affections. An *idyl* is a short pastoral poem, so named from a Greek word signifying a little image or picture: and an *eclogue*, is a pastoral poem, in which shepherds are introduced as conversing together. *Didactic* poetry, has for its chief object to convey instruction; and it is almost exclusively written in verse. *Satiric* poetry, is designed to reprove the vices, errors, and follies of mankind, by holding them up to censure or ridicule. *Descriptive* poetry, is that which simply describes interesting objects, either mental or material. *Romantic* poetry is usually descriptive; but its subjects are tales and remarkable adventures, like those of romances, and novels; sometimes probable, sometimes supernatural.

Dramatic poetry, in prose or verse, is that kind in which various persons are introduced as speakers and actors: it being designed for rehearsal on the stage; and its name being derived from a Greek word signifying action. A *Tragedy*, is a dramatic poem or play, of a grave character, and usually having a fatal termination: but a *Comedy*, is a more sportive play, designed for amusement or satire. A *Melodrama*, is a dramatic performance in which songs are introduced; and a *farce*, is a minor play, usually performed after one of a graver cast, for the sake of diversion and variety. The *prologue* is the introduction to a play; and the *epilogue*, is the concluding address. An *Opera*, is a drama set to music: and a Comic opera, or *opera buffa*, is one of a sportive kind, in contradistinction from the *opera seria*. A *pantomime*, is a theatrical performance consisting merely of action, without words.* A *cantata*, is a diversified poem, intended to be sung. A *sonnet*, is a poem of fourteen lines; usually the amplification of some striking thought. The first sonnets were those of Petrarch. A *madrigal*, is a short poem, of variable length and construction, usually on some tender, delicate, or simple subject. An *epigram*, is a brief expression of some witty thought, often, though not always satirical. An *acrostic* is a short poem, in which the first letters, syllables, or words, of the successive lines, taken together, form a word or sentence by themselves.

The name *Romance*, is applied sometimes to works of fiction in general, sometimes to individual works of this class; and sometimes it is used to express the spirit, taste, or style in which such works are composed. It comes from the mixed Latin, or Romance language, used by the *troubadours*, or minstrels, of Provence, in France; whose compositions first received this appellation. The word *Novel*, from the Italian *novella*, a tale or story, has been more recently introduced in our language, as applied to works of fiction. A *romance*, is properly one of the older or more extravagant compositions; and a *novel* is one of the more recent and natural, relating usually to historical facts, or social life. The earliest romances, narrating the exploits of Arthur and his knights, or of Charlemagne and his peers, are full of supernatural agents and events: those of intermediate date also deal largely in mystery and extravagance; but the better class of modern novels, a limited few, are valuable, as giving the ideas of well informed writers concerning men and manners, character and conduct, in the various phases and emergencies of life. Some of these works are auxiliary to geography and history; presenting new views, or details, which more systematic writers have omitted: but their statements are always to be received with caution; as they often take great liberties with the facts of the case. The name of *Tales*, is now mostly applied to brief novels or stories, such as those for children, and those which

* Although, in the following pages, mention is made of the most prominent dramatic compositions; it is with the conviction that the theatre, as at present conducted, is far more injurious than beneficial to the best interests of society, or of those who allow themselves to become its votaries.

abound in our lighter periodicals. *Fables*, or apologues, are also fictitious compositions, usually very short, but illustrating some important truth.

An *Essay*, is a literary composition, usually of limited extent, and confined to some particular topic ; though less restricted than an oration, in its construction and unity. A *Disquisition*, is similar to an essay, but more formal, and supposed to be more thorough, in its examination of the subject. A *Letter*, or Epistle, is the least systematic kind of composition; being usually addressed by the writer to some friend, or friends; and written in an easy, familiar style, on topics often miscellaneous, or of a personal character. Some few systematic works are written in the form of letters ; but these may be more properly arranged under the branches or subjects of which they treat. *Discourses*, are properly analyses or examinations of particular subjects ; their name being derived from the Latin *discurro*, I run through or over. An *Oration*, is a methodical discourse, designed to be spoken before a public assembly. Funeral orations are often styled *eulogies ;* (p. 243) ; and political or miscellaneous discourses often take the name of *speeches*. An *Address*, is an oration of less pretending character ; as the term was originally applied to a communication made to a sovereign or other superior party. Legal and Religious discourses, or pleas and sermons, belong, we think, more properly to the departments of Nomology and Theology. Of the principles which should govern such compositions, we have already spoken, under the branch of Rhetoric. (p. 74).

Of minor kinds of composition, besides those mentioned under Poetry, an *Enigma*, popularly called a Riddle, is a description, or a question, purposely obscured or concealed, to make the answer more difficult of discovery. A *Rebus*, is an enigmatical representation of some name or object, by means of pictures or emblems, instead of words. A *Charade*, is a designation of some particular word, by means of other words, which together will compose it; and which latter are enigmatically described, but not expressly mentioned. An *Anagram*, is a transposition of the letters in a word or phrase, so as to form some other word or phrase with the same letters. A *Pun*, is an expression containing some word which has two different significations; the contrast of which presents a witty or ludicrous idea: a *Conundrum*, is a question involving a comparison, the answer to which is a pun. A *Proverb*, or *aphorism*, is a brief expression of some important truth; and an *Apothem*, (Apophthegm), is a brief precept, or instructive remark. The termination *ana*, is applied to the names of distinguished persons, as a title to collections of their remarkable sayings; as *Johnsoniana* signifies the aphorisms and apothems of Dr. Johnson. A *Dialogue*, or *Colloquy*, is a composition in which several persons are introduced as the immediate speakers; the former term being more appropriate where there are several, and the latter where there are only two. In such compositions, a *Soliloquy* denotes a part spoken by one of the persons, supposed to be alone.

In the further examination of Callography, we shall pursue the ethnographical order, adopted in the three preceding departments;

regarding the poetry and the prose works of the same nation, as having a closer connection than the poetry of one nation has with that of another. In the minor subdivisions of this subject, we shall group together works of a similar character, though written by different authors; since the names of the latter have already been given in chronological order, in the department of Biography: and their productions will be mentioned collectively in the Bibliographical appendix to this work.

We proceed to offer an outline of Callography, under the four branches of Euclassic, Oriental, European, and American.

CHAPTER I.

EUCLASSIC CALLOGRAPHY.

In the branch of Euclassic Callography, we include the study of all the poetical and lighter prose works of the ancient Greeks and Romans; with all similar works, written prior to modern times, in the Greek and Latin languages. The poetical books of the Hebrew Scriptures, and perhaps some fragments of other oriental poetry, are more ancient than that included in the present branch: but their connection with the later oriental literature, extending down to the present time, induces us to preserve in this department the order adopted in the preceding; by assigning the first place to Euclassic, or Grecian and Roman literature. It should here be remarked, that as the earliest inhabitants of Greece and Italy were in a savage or barbarous state, the first dawn of polite literature as well as of science, came to them from the east, with the colonies which migrated thither, especially from Phœnicia and Egypt. Hence the influence exerted by the eastern mythology on that of Greece and Rome; and a similar influence might doubtless be traced through all the arts, had their earlier traditions and records been preserved.

§ 1. *Grecian Callography*, consists chiefly of Poetry; with some Fables and Tales, and Oratorical and miscellaneous productions. As the great fountain of European callographics, it deserves particular attention, aside from its intrinsic merit; and it may safely be said that in original and fertile genius, in beauty and sublimity, the Grecian writers have never yet been surpassed.

Among the Greeks, *Poetry* appeared much sooner than prose; perhaps because it was more easily remembered, in an age when writing was difficult: and the first poets were also musicians. Their earliest poetry was lyric and sacred, and appears to have originated in Thrace. The Greeks regarded Linus as the inventor of melody, and the first favorite of the Muses. Orpheus and Musæus, it is said, were his pupils; and wrote *dithyrambs*, or songs in honor of Bacchus; of which there remain only some fragments, of doubtful authenticity. *Pæans*, were originally hymns to Apollo, but afterwards addressed to other gods. The *oracles* of the ancient *Sibyls*, or prophetesses, may also be classed among the early sacred poetry of the Greeks. To the sacred poets, succeeded the *rhapsodists*, or minstrels; who rehearsed the genealogy of the gods, the origin of the world, and the exploits of demigods and heroes; but their rhapsodies were all eventually eclipsed by the compositions of Hesiod and Homer.

The principal *epic poems* of the Greeks, are the Iliad and the Odyssey, both attributed to Homer, who is styled the father of epic poetry. There seems but little doubt that these works were essentially composed by him; though many scholars suppose that they were not committed to writing till the times of Solon, or later. The subject of the *Iliad*, is the wrath of Achilles against Agamemnon; the misfortunes of the Greeks, on the withdrawal of the former; and their success, in the conquest and destruction of Troy, on his return. The *Odyssey*, describes the wanderings of Ulysses, after the fall of Troy; with his dangers and sufferings, till his safe return and reëstablishment in his kingdom, the isle of Ithaca. These works differ so much in subject and style, that some writers have attributed them, piecemeal, to various rhapsodists, collectively styled the *Homeridæ*, of whom Homer is admitted to have been the chief. The *Batrachomyomachy*, or battle of the frogs and mice, a mock heroic poem, attributed to Homer, was, doubtless, the work of a later age. The *Theogony* of Hesiod has been classed as an epic poem; treating of the origin and acts of the gods of Grecian fable. The *Argonautics*, of Apollonius Rhodius, relating to the Argonautic Expedition, is a work of some merit. The Perseid, Thebaid, and other epic poems of note, are lost: but the *Dionysiacs* of Nonnus, and the *Paralipomena* of Calaber, written in a later age, are preserved; though of minor importance. The *cyclic poets*, were imitators of Homer, of inferior note.

Grecian *lyric poetry*, was written in a great variety of metres, many of which were named from their inventors. Of the *odes* of Sappho, two only have been preserved, remarkable for their warm and tender feeling; one of them being a hymn to Venus. Many odes of Anacreon, have been preserved, most of them in praise of love, wine, and social pleasures. Pindar, sang, in more lofty strains, the praises of the victors, in the great public games of Greece; and many of his odes are still extant. The odes of Archilochus, Alcman, Alcæus, and others, have almost entirely perished. The poems called *scolia*, were songs for social and festive occasions. Callinus, of Ephesus, is said to have written the first poem in elegiac measure, which was properly a lyric; but Mimnermus, and Simonides, are regarded as the first elegiac poets, properly so called. Of Grecian pastoral poetry, the invention of which was attributed to Daphnis, the *idyls* of Theocritus, are the most important remains. The most beautiful of the idyls of Moschus, is the *Seizure of Europa;* and the principal one of Bion, is the *Funeral Song* in honor of Adonis.

Of Grecian *didactic* poetry, the earliest specimen is the *Works and Days* of Hesiod; the first book of which consists principally of moral precepts, and the second of rules of husbandry; concluding with a repetition of precepts on the conduct of life. The term *gnomic poetry*, has been applied to collections of moral precepts or aphorisms; such as those of Solon, and the *Golden Verses*, so called, attributed to Pythagoras, but of doubtful authenticity. Dicæarchus wrote a didactic poem on *Grecian geography;* Archestratus another on *Gastrology;* and Nicanor wrote two others on medical subjects, the *Theriaca*, and *Alexipharmaca.* The poem of Aratus on *Astronomy*, is mentioned as a superior production. Most of the Grecian *satires*, are in the dramatic form; but we may here mention the *Silloi*, (Σιλλοι), or didactic satires, of Timon of Philius, and others. Of *descriptive poetry*, we may instance Hesiod's *Catalogue of Women*, and his *Shield of Hercules;* both of which are supposed by some writers to have been parts of a larger poem, now lost. The only romantic poems in Greek, which have been preserved, belong to the Byzantine age, and are of little merit.

Dramatic poetry, in Greece, took its rise from the religious ceremonies, in which representations were introduced of some scene, or action, relating to the god in honor of whom they were instituted. Thespis of Icarus, in the time of Solon, is said to have invented *tragedy*, and to have introduced greater refinement in theatrical amusements. He first assigned a part of the rehearsal to an actor, in order to relieve the chorus; Eschylus added a second actor, to admit of dialogue; and Sophocles added a third, or even a fourth speaker, to increase the interest of the fable or plot. The three great tragic poets of Greece, are Æschylus, Sophocles, and Euripides. The *Prometheus bound*, of Eschylus; the *Œdipus Tyrannus*, of Sophocles; and the *Medea*, of Euripides; are regarded as their best productions. Grecian *comedy*, is said to have sprung from the choral songs of villagers; and Epicharmus of Cos, is mentioned as the first writer of comedy, about 470 B. C. Living persons, and public characters were represented and satirized in comedy, until the abuse of this practice led to its suppression. Aristophanes is the only comic poet, of whose plays any are still preserved complete. In his comedy entitled the *Clouds*, he ridiculed Socrates; and he attacked Euripides, in another, entitled the *Acharnians.* Of the later comedies of Menander, only some slight fragments remain. The *satirical dramas*, of the Greeks, were a peculiar kind, intermediate between tragedy and comedy, not generally satirical in the modern sense; but so named from the chorus of satyrs, introduced to enliven the performance. The *Cyclops*, of Euripides, is the only specimen of this kind which has been preserved.

The early works of fiction in Greece related to their mythology: and works of romance were unknown until a later period. The *Cyropædia* of Xenophon, describing the education of Cyrus of Persia, but supposed to contain more of fiction than of fact, has been sometimes styled a political novel. The *Milesian* and *Ionian Tales*, have mostly perished; but from what is known of them, we have little reason to regret their loss. The piece by Lucian, styled *Lucius or the Ass*, is a specimen of this kind; and his *True History*, is chiefly a satire on travellers, who indulge in the marvellous. The *Babylonian Histories*, or Loves of Rhodane and Simonis, by Jamblichus of Syria, was probably the most ancient romance proper; and next to it was the *Ephesiaca*, by Xenophon of Ephesus. The

Choice of Hercules, by Prodicus, is one of the most beautiful fictions of ancient times. The chief Grecian *fables*, are those of Æsop, originally composed in prose, but afterwards paraphrased in verse, by Socrates and others. Of Grecian *epistles*, or letters, which have been preserved, a few only are genuine; among which are some by Isocrates, Demosthenes, and Aristotle. The only amatory letters before the time of Constantine, are those of Alciphron.

Of Grecian *eloquence*, Athens was the great school and theatre, commencing as early as the times of Solon. The *orations* of Pisistratus and Themistocles, of Pericles and Alcibiades, were highly praised, but are lost. Lysias, is celebrated for his *Funeral oration*, over the Athenians slain under the command of Iphicrates; and Isocrates, for his *Panegyric*, pronounced at the Olympic games, and his *Panathenaic*, or eulogy of the Athenians. The orations of Isæus, are chiefly legal, relating to inheritances. Those of Demosthenes include the *Olynthiacs*, and *Philippics*, directed against Philip of Macedon; besides many judicial, and several political speeches; of which that *Concerning the Crown*, in defence of Ctesiphon, and of his own policy against Philip, is regarded as the best. The previous oration of Æschines, *against Ctesiphon*, who had advised the Athenians to present a golden crown to Demosthenes, was unfortunate for its author, and led to his banishment from Athens. We have only room to add that the *Dialogues* of Plato are philosophical, and the characters well sustained; similar to which is the *Picture*, by Cebes, (Cebetis Tabula), an allegorical dialogue, of excellent tendency. Lucian's *Dialogues of the Gods*, and *of the Dead*, are rather satirical than philosophical; but written in a bold and vigorous style and spirit.

§ 2. *Roman Callography*, is chiefly derived from Grecian models; to which it is inferior in originality, but equal in interest and importance. The Romans paid but little attention to literature, until after their conquest of Greece; the arts and productions of which, inspired them with taste, and furnished them in part with subjects for composition. The most flourishing period of Roman literature, was in the last ages of the republic, and the reigns of the first emperors, especially that of Augustus. Its decline was hastened by luxury and tyranny, and, ultimately, by the invasions of the northern horde of barbarous nations. The literature of the middle ages, being chiefly in the Latin language, may properly be associated with that of Rome, though of minor importance.

The first Roman *epic poet*, is said to have been Ennius; whose poem, entitled *Annals*, is rather a chronicle in verse, than a regular epic; being devoted to a description of Roman exploits, down to his own times; and drawn, perhaps, from *national ballads*, which were common at an earlier period. The chief epic poem of the Romans, is the *Æneid*, of Virgil; which describes the adventures of Æneas, from his leaving Troy when it was taken by the Greeks, until his final settlement in Italy, as the supposed ancestor of the Roman nation. The poem of Lucius Varius, celebrating the exploits of Augustus and Agrippa, is, with several other minor epics, totally lost. Lucan's *Pharsalia*, ranked as an epic poem, describes the wars of Pompey and Cæsar: the *Argonautica*, of Valerius Flaccus, describes the Argonautic expedition: the *Punica*, of Silius Italicus, treats of the second Punic war: and the *Thebaid* and *Achilleid* of Statius, relate respectively to the contest of the Theban brothers, Eteocles and Polynices; and the adventures of Achilles, before the Trojan war. The *Gigantomachy*, of Claudian, and the *Antoniad*, of Gordian, belong to a later age; and the *Christiad*, is a modern Latin poem, written by Mark Jerome Vida, who died in 1566.

Roman *lyric poetry*, seems to have commenced with Catullus, who wrote a few odes; but the odes of Horace, amatory, convivial, moral, and political, rank, in grace and spirit, second only to those of the Grecian Pindar. The *Silvæ*, of Statius, contains two odes of merit; subsequent to which the only lyrics of note were the *hymns* of the Christians, commencing with those of Hilarius and Prudentius. The chief *elegies*, of the Romans, are those of Catullus, Gallus, Tibullus, and Propertius; most of which have been preserved. The *Tristia*, of Ovid, belong to this class. Of Roman *pastoral* poetry, the *Bucolics* of Virgil, chiefly eclogues, are very beautiful, though mostly imitations; as are also the later eclogues of Calpurnius. The *idyls* of Ausonius and Claudian, are not of a pastoral character.

The earliest Roman *didactic poems*, were probably those of Ennius, entitled *Phagetica*, on diet and eatables; and *Epicarmus*, a translation, concerning the nature of things. The poem of Lucretius, *On the Nature of Things*, is a digest of the Epicurean philosophy; and the *Georgics*, of Virgil, is a beautiful didactic poem relating chiefly to agriculture. Ovid's *Metamorphoses*, and *Fasti*, are chiefly mythological, derived from Greek books now lost; and hence they are more valuable. Horace's *Art of Poetry*, may be mentioned in this class, as a superior production. The poem entitled *Ætna*, is attributed by some to Cornelius Severus; but by others to Lucilius Junior. There are also poems by Atacinus, on geography, and navigation; by Columella, on gardening; by Palladius, on grafting; by Maurus, on grammar; and by Vida, in later times, on the art of poetry. Of Roman *satires*, the earliest were those of Ennius and Pacuvius, chiefly of a comic character. Lucilius introduced a more grave and severe style; but the satires of Horace are considered superior. The Menippean satires of Varro, and Petronius, and the more caustic ones of Persius and Juvenal, exhibit in a strong light the vices of declining Rome. The *epigrams* of Martial surpass those of Catullus, and have much point and spirit; but they are too often tainted with licentiousness.

The earliest *dramatic* performances in Rome, were those of the Tuscan *Histriones;* who sang and danced to the music of the flute. The *Attelane Fables*, were a rude kind of comedy or farce, so named from Atella, a city of the Osci; hence also named *Oscan plays*. Regular dramatic pieces were first exhibited in Rome, about 240 B. C., by Livius Andronicus; who is regarded as the founder of Roman *tragedy*. Tragedies were also written by Ennius, Pacuvius, Attius and Nævius; but they are chiefly borrowed from the Greek. The best Roman tragedies, including *Medea*, and *The Tro-*

jans, are attributed to Seneca, the philosopher. The *comedies* of Plautus, among which are *Amphitryon*, and the *Boastful Soldier*, and those of Terence, more refined, of which the *Andria* is deemed the best, were long popular in Rome, till superseded by gladiatorial and other shows. Some fragments of comedies by Cæcilius are also preserved, and possess some merit.

Into the wide field of *Romance*, the Romans seem scarcely to have entered. The Metamorphosis, or *Golden Ass*, of Apuleius, analogous to the Milesian Tales, describes a youth named Lucius, as being changed into an ass, to punish his vices and presumption, but restored again by resorting to the mysteries of Isis. The *Satyricon*, of Petronius Arbiter, describes the love adventures of Encolpius, a young freedman; and thus portrays the character of the times; being at the same time a satire and romance. Of Roman *fables*, the principal are those of Phædrus, partly translated from Æsop, but containing many new ones written in the same style and spirit. Avianus also wrote fables in verse, and Titianus in prose. The *epistles*, or letters, of Roman writers, are numerous. The most valuable, are those of Cicero; many of which are letters of business, addressed to the great men of that age; and with them are preserved several letters of Julius Cæsar, and others. Pliny the younger, left many letters, of value; some of which are descriptive; others, like those of Seneca, are moral or philosophical. We have also letters of minor interest by Fronto, Symmachus, Sidonius, and others.

Roman *oratory*, as well as poetry, seems to have been first carefully cultivated in imitation of the Greeks; to whose manner, Cato, himself an orator, was strongly opposed. Antony, the grandfather of Mark Antony, was surnamed the Orator, from his eloquence; and Crassus, died of a fever, from the excitement of delivering a powerful oration before the senate. Their orations, like those of the celebrated Hortensius, the early rival of Cicero, are now lost. *Cicero*, has ever been regarded as the first of Roman orators; ranking with the Grecian Demosthenes. His most celebrated orations are those against Mark Antony, called Philippics; those against Verres; those against Cataline; and those in opposition to the Agrarian law; all of which fortunately have been preserved. Next to these, in interest, should be mentioned the *Panegyric*, so called, of Pliny, the younger; in praise of the emperor Trajan. His other orations are lost. Seneca and Quintilian should be mentioned rather as rhetoricians than orators; and the last remains of Roman oratory, the panegyrics of the later emperors, are valuable only as auxiliaries to history, in illustrating the decline of the empire.

CHAPTER II.

ORIENTAL CALLOGRAPHY.

In the branch of Oriental Callography, we include the poetry and romance of the oriental or eastern nations, both ancient and modern.

It is a wide field of research, which has hitherto been very imperfectly investigated, but is attracting increased attention. The literature of the orientals is surprizingly extensive, when it is considered that the greater part of it is preserved in manuscript: but of many of its valuable works few copies exist; and but a small portion has yet been translated into the European tongues. While there are strong resemblances between these works and those of European writers, there are also striking differences; such as to excite much interest in the study and comparison, in those who once commence it. Much of the oriental poetry relates to history, mythology, geography, and politics; and is important in illustrating the knowledge of these subjects possessed by the oriental nations. Their romantic and imaginative poetry is very rich; sometimes delicate and natural, but often gorgeous and bombastic.

Ancient Egypt, we believe, has left no poems or romances on record; though some of its hieroglyphics are doubtless highly poetical. The ancient Hebrew poetry is chiefly, if not solely, comprised in the Sacred Scriptures; and its study belongs therefore to the department of Theology. It is remarkable that the Mohamedan nations generally, though rich in imaginative writings, have no dramatic poetry; owing, perhaps, to their peculiar social institutions. The literature of the East, so far as it is known to us, is principally confined to the Arabic, Turkish, Persian, Sanscrit, and Chinese languages; the callographic writings in which, we proceed to notice, in the order here named.

§ 1. *Arabian Callography*, belongs mostly to the middle ages; and may be regarded as filling the chasm which exists between the literature of ancient, and that of modern Europe. At a time when learning was almost eradicated from Christendom, it flourished at Cordova and Bagdad, then the great seats of Mohamedan power. The caliphs Haroon al Rasheed, Al Mamun, Al Mansur, and Motassem were among its patrons, and, as early as the ninth century of our era, the Arabians had translated the writings of Euclid, Diophantus, Hippocrates, Galen, Theophrastus, Aristotle, Pliny, and others; some of which have been preserved to us through their means.

Arabian *poetry*, dates back to an earlier period than the origin of the Mohamedan religion. In the fairs held at Mecca and Okadh, about A. D. 500, poetical contests took place, and the prize poems were hung up in the caaba or temple, written in letters of gold. Seven of these, collectively called the *Moallacat*, (Moallakath, or hung up), have become particularly celebrated. Their authors were Amralkeis, Tharafah, Toheir, Lebid, Antara, Amru (Ben Kalthun), and Hareth, called the Arabian Pleiades; who sang of religion, patriotism, love, and revenge, in highly impassioned strains. These poems are preserved in the *Greater Hamasah* or Anthology, a select collection of poems, compiled by Abu Temam, A. D. 830; and also in the *Lesser Hamasah*, compiled by Bochteri, in 880. Among the Arabians, Turks, and Persians, a *gazelle*, or *casside*, is a poem, the alternate lines of which rhyme together throughout the piece; and a choice collection of poems, they call a *divan*.

The *elegies* of Motenabbi, are noted for their tenderness: and those of Tograi, (or Thograi), vizier of Bagdad, are held in high repute. The *idyls* of Abu Becr are much esteemed, as also the *Song* of Al Nasaphi. The *Dha Argiouzat* of Al Gazi, contains every Arabic word in which the letter *Dh* occurs. The *Lamiats* of Tograi, Shafari, and Abu Mansur, have every line ending in L; the *Bordah* of Ibn Zadun, has every line closing with the letter M; and in his *Nuniat*, each line ends with the letter N. The poem of Abi'l-olae, in praise of Prince Saïd, and the later poems of Faredh, are mentioned as particularly beautiful. So also is the volume by Abu'l Cassem, entitled *Particles of Gold*. D'Herbelot, in his Bibliothèque Orientale, enumerates upwards of thirty Arabian poets, and their works; of which we have no room here to speak farther.

The *epic poetry* of the Arabians, being all of a romantic character, we reserved for the present place. Admai's (or Asmai's) great heroic romance, *Antara's Life*, describes the exploits of Antara, (or Andar), an Arabian prince, whom we have already mentioned as one of the poetical Pleiades. The *Mecamat*, (Makamat), or Sessions, by Ithiel Hariri, is a romantic history of a knight errant: and the *Natural Man*, by Ibn Tophail, is a philosophical romance of great interest. The *Life of Timur*, (Tamerlane), by Ebn Arabshah, is regarded by Sir William Jones as an epic or heroic poem of great merit: but the great storehouse of Arabian romance, is *Alf Lail u Lail*, or the thousand nights and one night, commonly known as the Arabian Nights Entertainments; a collection of wild and beautiful tales, said to have been translated from the Persian, in the times of the caliph Al Mansur, and now translated into most of the European tongues. The *fables* of Lokman, were written, it is believed, since the rise of Mohamedanism; and they have found more favour in Europe than at home.

Of *Turkish Callography*, we have very little to say, except that it appears to be quite meagre. The romantic poem entitled *Chosroes and Shereen*, by Molla Khosrew, is, we believe, derived from the Persian. The principal lyric poet of the Turkish language, is Baki, whose *divan*, or collection of odes and songs, contains many beauties. They have also an *Anthology*, of choice poems, collected by Latifi and Tschelebi; besides other minor poems, among which are the songs of Mesihi, mentioned by Sir William Jones. The paucity of Turkish literature is owing perhaps in part to the abundance of the Arabic and Persian; of which the Turks are fond, and which supplies the place of a national literature of their own.

§ 2. *Persian Callography*, closely resembles the Arabian, both in style and subjects; unless, perhaps, it is more devoted to luxury and the tender passions. It abounds, however, in pure and beautiful sentiments; numerous specimens of which are furnished in the translations, by Sir William Jones and others. The Persians have one great epic poem, as distinct from the romantic; or rather a collection of epics, called the *Shah Nameh*, (Shanamah), or Book of Kings, begun, it is said, by Dakiki, continued by Ansari, but completed by *Ferdusi*, to whom the whole work is commonly attributed. It is a poetical history of Persia, in detached portions, extending from Nourshivan to Yezdegerd; and signalizing the exploits of Rustem, (or

Rustan), the Hercules of Persia. The history of Alexander the Great, entitled *Iskander-Nameh*, is a favourite subject in Persia; and has been written by Nizami; by Mir Ali, of Shirvan; by Achmed of Kirvan; by Emir Soliman; and by Jami; the first and last of whom have best succeeded. Ahmedi composed a heroic poem, on the actions of Tamerlane.

Among the Persian *lyric poems*, are those of Ansari, Essedi, and Anvari, (or Enweri), whose *cassides* are unsurpassed. The odes of Khakani, (or Chakani), are spirited and sublime: and those of Mir Chosru, (or Emir Khosrou), are very elegant. The *divan*, of Hafiz, contains many sprightly odes and songs, chiefly anacreontic. There are also books of odes, or *divans*, by Jami, Ahli, Saib, Arsi, Casim, Shahi, Hatefi, Senai, Shefali, and others. The *Gulistan*, or bed of roses, and the *Bostan*, or garden, of Sadi, are longer poems, highly praised, both for style and morality. Jamis *Beharistan*, or mansion of the spring, as also his Chain of gold, Gift of the noble, and Manners of the just, are moral and didactic poems, like those of Sadi. The Lawful magic, and the Taper and the moth, by Ahli; the Secrets of lovers, the Seven faces, and the Treasure of secrets, by Nizami; and the Junction of two seas, Beauty and love, the Conqueror and triumpher, by Catebi, we have barely room to mention. The *Pend-Nameh*, of Attar, a contemporary of Sadi, is a valuable collection of proverbs: and the *Kilat el Metnavi*, (or Masnavi), of Geladdin Roumi, surnamed Balkhi, treats of religion, history, morals, and politics, with great energy and richness. Reshidi's Enchanted gardens, is a treatise on the art of poetry.

Of Persian *romantic poetry*, and romance, the story of *Leila and Meinoun*, (or Laila and Mejnoun), has been written by Nizami, Hatifi, Jami, and others. Nizami also wrote the loves of *Chosru and Shirin*, (or Chosrou and Schirin); and Jami wrote *Joseph and Zuleika*, (Jussuf or Yusuf and Zuleica), as also *Selman and Absal;* both of which are contained in his collection of seven poems, called the Seven stars of the bear. *Baharam and Gulendam*, is a romantic poem by Catebi; and there are long poems by Chosrou, Abubatha, and Nani, probably of a romantic character. The *Thousand and one Nights*, is said to have been written by Humai, a Persian queen; and the *Thousand and one Days*, in imitation of it, is devoted to the praise of men, as the former is to the vindication of women. The *Bahar Danuch*, or garden of knowledge, by Doollah, or Oollah; the *Tooti-Nameh*, (Tuti-nama), or tales of a parrot, and the *Tales of Bakhtyar*, and the *Ten Viziers*, are also of a romantic character. The *Hatim Tai*, is a popular romance on the adventures of Hatim; and the *Heft Peiker*, by Nizami, relates to the adventures of Behram. The *Bostan i Khyal*, or garden of imagination, is an historical romance. The *fables* of Pilpay, so called, have been translated into Persian by Rudigi, (or Roudeki), under the title of *Anwar Soheili;* and there are other translations of the same.

§ 3. *Hindoo Callography*, is chiefly based on the Hindoo Mythology, as comprehended in the sacred books, in the Sanscrit tongue, which we have already mentioned in the department of Theology. (p. 133). It is chiefly in the hands of the Brahmins; and has been but recently cultivated by European scholars. The oldest poem of the Hindoos, is said to be the *Ramayana*, (or Ramayon), by Valmiki, (or Balmiki), describing the exploits of Rama, or Ramatshandra, king of Ayodya, supposed to be an incarnation of Vishnoo; who wrought wonders in rescuing his beloved Sita. Next to this is the *Maha-bhárata*, (or Mahabharat), by Vyasa, which treats of the wars of the Curavas and Puravas, (or Kurus and Pandus), two branches of the race of Bharata, who strove for the sovereignty of India, it is said, 1391 B. C. In this war, gods, and giants, and heroes, particularly Crishna, (Krishnoo), are represented as taking part; and the episode called *Raghu-vansa*, gives a distinct history of the race of Crishna. These are both sacred poems, and rank next to the Vedas. The *Gita Govinda*, by Djaga Deva, (or Jayadeva), and the *Bhagavata*, or Bagavadam, which is one of the Puranas, and attributed to Vyasa: both also relate to the life and exploits of Krishnoo. The *Cumara Sambhava*, (or Koumara), by Calidasa, is an epic poem on the birth of Cartica, or Kumara, the physician of the gods; and Calidas also wrote a *Raghuvansa*, or children of the sun, perhaps the one already mentioned, besides the *Meghaduta*, or cloud messenger, and the *Nalodaya*, or rise of Nala, both elegant love tales. The poem called *Bhatti*, is a popular epic, by Pandita; and the *Rasamanjari*, by Misra, is an analysis of love. The meeting of *Arjoun and Seva*, is described by Djana Radjah; but the subject of the *Kadambari*, by Bhattu Bana, we have been unable to ascertain. The Puranas, being among the sacred poems, we shall not here attempt to describe. The *Manava Dharma Shastra*, or Institutes of Menu, embrace not only the Hindoo laws, but morals and mythology.

Of Hindoo *romance*, we would mention the *Vrihatcatha*, and the *Cat'ha Saritsagara*, both collections of tales by Somadeva; the former in verse; also *Singhasana*, or the throne of Vicramaditya, consisting of tales supposed to have been related by the images surrounding the throne; and finally the *Suca Saptati*, or seventy tales of a parrot, from which the Persians probably borrowed their Tootinameh. The *Hitopadesa* of Vishnu Sarman, is a collection of elegant fables, so connected as to form a code of moral and political instruction: and Sir William Jones supposes that their title, abbreviated and corrupted in Persian, was mistaken for the name of a person; but that no such person as Pilpay ever existed. Of Hindoo *dramatic poems*, or Natacas, the *Sacontala*, (Sokuntolo), or Fatal Ring, by Calidasa, is regarded as the best performance; and next to it is his *Urvasi*, (Ourvasi Vikrama), or the heroism of Urvasi. The *Ketriabali*, or pearl necklace, by Hersadeva; the *Prabodha Chandrodaya*, or rising moon of knowledge, by Misra; the *Maha Nataca*, or great drama, by Misra Murari; and the *Hasyarnava*, or sea of laughter, a farce by Jagadiswara, (or Bhaltatcharia), are all dramatic productions of interest and value. So are Malati and Madhava, (or Malheva), and the Malignant Child, the Rape of Usha, the Taming of Durvasas, the Seizure of the Lock, and others, by unknown authors.

§ 4. Of *Chinese Callography*, we have very little to say. The Chinese have considerable poetry; much of which appears to treat of their formal systems of morals and politics; though some of it is highly imaginative, arising in part from the structure of their language. The most ancient and approved of the Chinese poetry, is the *Shee King*, (or Shi Kin), a collection of three hundred odes, composed or preserved by Confucius, and many of them in praise of the early princes of China. The *Tsoo-tsee*, and the *Shan-hay-king*, are poems on philosophical and romantic subjects; and the *San-tsee-king*, consisting of verses of three syllables, is one of their elementary books for the young. Among the poems of the late emperor Kien-long, is one on the city of Mougden, the capital of Mantchooria. We believe that Soolo and Kien-gan, are also the names of Chinese poets. Among other dramatic productions, the Chinese have a collection entitled the *Hundred plays of Yuen;* chiefly historical; among which are the Heir in old age, and the Chalk ring or circle. Two plays of this collection, The *Orphan of China*, and the *Sorrows of Han*, have been translated into English.

Of Chinese romance, we may mention *Haou-kew-chuen*, or the Fortunate Union; an imperfect translation of which, has been incorrectly entitled the Pleasing History. It relates to the trials and happy marriage of Teihchungyn, (or Tingsing), and the beautiful Shueypingsing. *King-ping-moey*, is the title of another romance, in which Symengking, the wealthy hero, marries six wives. The three Lins are the principal personages in another novel, in praise of virtue: but whether *Yu-keao-le*, (or Iu-kiao-li), is the title of this, or of another one, we have not been able to discover. In another novel, the hero, Tchouangtse, (or Tcho-ang-tse), finds his wife unfaithful, and, after her death, becomes a famous philosopher. This is said to have been the original of Voltaire's Zadig.

CHAPTER III.

EUROPEAN CALLOGRAPHY.

The Polite Literature of Modern Europe, though of later growth than either of the preceding branches, and formed in some degree on the model of the ancient classics, is not to be regarded as inferior to them, either in extent and variety of subjects, or in grandeur and beauty of sentiment and style, or even in its intrinsic importance. We have no hesitation in placing Dante and Milton in the same exalted rank with Homer and Virgil: and if the present branch cannot furnish exact parallels to all the great writers of antiquity, it can at least produce those of equal merit, and in still more various kinds of composition.

Modern European Callography originated in the middle ages, commencing, we believe, with the songs of the German Minnesingers, and of the Provençal or Romance poets, in France and Italy. It fed upon the remains of Euclassic literature; the preservation of which is due in no small degree to the labors of the ecclesiastics, sheltered, in their convents, from the storms of war and the revolutions of states. Hence it was that the term *clerk*, from the Latin *clericus*, a clergyman, came to signify a writer, or scholar. The decline of the feudal system, and the consolidation of society, were favorable to the growth of literature; but it did not reach its maturity till the invention of printing enhanced the value of literary fame, by spreading it to the four winds of heaven, and wafting back the echo to reward the author's labours. The Reformation widened the field of literary research; the Discovery of America presented new themes for inspiration; and the number of competitors was increased by those eastern scholars who took refuge in Christendom when the Byzantine empire was subdued by the Turks. No wonder then that a fresh harvest was reaped; worthy of the age, the labors, and the circumstances, which produced it.

We proceed to treat of European Callography, in the order adopted in the preceding departments.

§ 1. *Italian Callography*, may be regarded as commencing with the love songs, composed at the court of Sicily; the oldest compositions which have been preserved in the Italian language. Still, the Latin was deemed the only dignified language of literature, till the vulgar tongue, so called, was ennobled by the great work of Dante, and thenceforward met with public favor. The *Divina Commedia*, of Dante, is an allegorical and didactic, rather than epic poem; describing an imaginary visit of Dante, conducted by Virgil, to Hell, to Purgatory, and to Heaven, or Paradise; with a description of each, and of its inhabitants, founded partly on Mythology, but principally on the dogmas of the Roman Catholic religion. This poem has passed through nearly sixty editions, and has had more commentators than any other work written since the revival of letters in Europe. The *Dettamondo* of Uberti, describing the universe, and the *Quadriregio*, of Frezzi, on the empires of love, Satan, virtue, and vice, are inferior imitations of Dante.

Petrarch's *Africa*, was written in Latin; but the first epic poems in Italian, were *La Theseide*, and *Il Filostrato;* both by Boccacio; both now almost forgotten. The *Morgante Maggiore*, of Pulci, narrating the exploits of Roland or Orlando, with Rinaldo, and the giant Morgante, probably suggested the *Orlando Inamorato* of Boiardo; and this, in its turn, led to Ariosto's *Orlando Furioso;* an epic and romantic poem, on the exploits of Roland, one of Charlemagne's paladins, or knights errant, who fell in the battle of Roncesvalles. The *Orlando Amoroso*, of Berni, was written in a more sportive vein. The *Armida*, of Bernardo Tasso, and the *Rinaldo*, of his son Torquato Tasso, are both respectable productions; but the latter writer is immortalized by his *Gerusalemme Liberata*, or Jerusalem Delivered; the noblest of Italian epics; describing the exploits of Godfrey of Bouillon, and his associates, in the first crusade. Trissino's *Italia Liberata*, or Italy delivered from the Goths, is a similar but inferior production; and the *Adone*, or Adonis, of Marini, is of little repute.

Of Italian *lyric poetry*, the *canzoni*, or ballads, and the *sonetti*, or sonnets, of Petrarch, are the most celebrated. The latter are mostly devoted to his love for the virtuous Laura; but the former are patriotic and religious. The sonnets of Lorenzo di Medici, are in imitation of those of Petrarch; and those of Uberti, are highly esteemed, as also the later ones of Bembo and Frugoni. Of pastoral poetry, the *Arcadia*, of Sannazaro, contains some beautiful idyls; the *Sagrifizio*, or Sacrifice, by Beccari, was the first Italian pastoral in a dramatic form; and the *Aminta*, of Tasso, is a beautiful pastoral drama, in which shepherds and shepherdesses are the speakers. The *Pastor Fido* or Faithful Shepherd, by Guarini, is similar to the Aminta; alike original and beautiful, though perhaps less critically composed. Of *descriptive* poems, we would mention the *Ambra*, of Lorenzo di Medici, in praise of his gardens; the *Tournament*, of Politiano; the *Sette Giornate*, or Seven Days of Creation, by Tasso; and the *Coltivazione*, of Allemanni, a descriptive and didactic poem on Agriculture.

Of Italian *dramatic poetry*, the *Sophonisba*, of Trissino, was the first regular tragedy; and next to it was the *Rosmonda*, or Rosamond, of Rucellai. The *Jocasta*, of Dolce, and the *Orbecche*, of Cinzio, (or Cintio), are among the older tragedies of merit. Tasso wrote one tragedy, entitled *Torrismondo:* and that of *Merope*, by Maffei, suggested those on the same subject by Alfieri and Voltaire. Of the numerous tragedies of Alfieri, the best are probably those entitled *Saül*, and *Abel*, both from Scripture History; the latter of which, intermediate between a tragedy and opera, was called by its author a *tramelogedia.* The *Galeotto Manfredi*, of Monti, is a more recent tragedy of note. Goldoni excelled chiefly in comedy; but his *Belisarius*, is a valuable tragedy. The first opera, was composed by Rinuccini, about 1594; and the first performed at Naples was in 1615: but the best of the early operas was probably that of Apostolo Zeno, entitled *L'Inganno Felice*, or the Fortunate Stratagem, performed at Venice in 1695. The operas of Metastasio are unsurpassed: among them are his *Didone Abbandonata*, or Dido Forsaken; *La Clemenzia di Tito*, or the Clemency of Titus; and *Hypsipyle*, or the conspiracy of the Lemnian women. Among the early Italian comedies, are the *Virginia*, of Accolti; and *La Mandragora*, and *La Clizia*, by Macchiavelli: but the most esteemed, are those of Goldoni, the first of which was *La Donna di garbo*, or the Lady of merit. Those of Avelloni are also popular.

Of Italian *romantic poetry*, and *romance*, some of the oldest specimens are the *Aspramonte*, by an unknown author; *Giron il Cortese*, or Giron the Courteous, by Alamanni; and the *Amadis*, by Bernardo Tasso; all of them tales of chivalry and magic. The oldest collection of Italian prose tales, extant, is the *Centi Novelli Antiche*, or Hundred ancient stories, by unknown authors. Boccacio wrote two novels; one entitled *Fiammetta;* the other called *Filocopo;* both chiefly amatory: and Macchiavelli is the author of *Belfagor*, a satirical novel against scolding women. Here may be mentioned the tales of Boccacio, Sacchetti, and Giovanni; none of which can be recommended as worthy of general perusal. Giraldo Cinzio also wrote a collection entitled the *Hundred Fables;* most of which are mere stories. The historical species of romance has lately been introduced into Italy by Manzoni, in *I Promessi Sposi*, published by him in 1827. In oratory, we have the published orations of Badoaro, Lollio, and others; but Italy has produced few orators of distinction.

The older *Spanish poetry*, consists chiefly of ballads, or metrical romances, many of which are preserved in the *Romancero General* collected by Florez; but their authors are in many cases unknown. The earliest poem worthy of notice here, is *El Poema del Cid*, a brief epic and romantic composition, written about 1150, by an unknown hand, and narrating the exploits of Don Rodrigo, called the Cid, who fought against the Moors. The *Historia de los Vandos*, is a romantic chronicle, in verse, of the Moorish heroes, the Zegris and Abencerrages of Grenada. The *Araucana*, by Ercilla y Zuñiga, is an epic poem, of historical value; describing the subjugation of the Araucanian Indians, and their struggles to regain their independence.

Of Spanish *lyric poetry*, a large collection of old songs is contained in the *Concionero General*, collected by Baena and Castillo. The sonnets and *songs* of Boscan, and the sonnets and *eclogues* of Garcilaso de la Vega, are highly valued, though partly formed on the Italian model. Montemayor and Miranda, though Portuguese, wrote also some excellent pastorals, in Spanish. The *Diana* of the former is a pastoral romance. The *odes* of Herrera, and the *canticles* of Luis de Leon, are said to be rich in sentiment and diction. The *Galatea*, of Cervantes, is of a pastoral character; and the Spaniards have pastorals also by Enzina, and others. *La Gaya Ciencia*, or the Gay Science, by Villena, is a didactic poem on the art of poetry. *El Labyrintho*, or *Las Trecientas*, The Labyrinth, or Three Hundred stanzas, by Juan de Mena, is an allegorical picture of human life, in imitation of Dante. The *Centiloquio*, or Hundred Maxims, by Mendoza of Santillana, is a didactic poem on morals and politics; and his *Doctrinal de Privados*, or Manual of Favorites, contains moral lessons for courtiers.

Spanish *dramatic poetry*, may be regarded as commencing with the *Mingo Rebulgo*, a satiric pastoral play; and the dramatic romance of *La Celestina*, or Calixtus and Melibœa. The earliest dramatic performances, were probably the *Mysteries*, so called, representing scripture scenes, exhibited as religious ceremonies; and these suggested the *Autos Sacramentales*, or religious dramas, of the later writers. Cervantes wrote nearly thirty dramatic pieces, of which only two now remain. They are *Numantia*, a tragedy; and *Life in Algiers*, a comedy. Lopez de Vega wrote eighteen hundred comedies, and four hundred religious dramas; of which more than three hundred were printed. Among the best of them, are, *La Discreta Vengança*, or the Discreet Revenge, and *Lo Cierto por lo Dudoso*, the Certain for the Doubtful. They are lively and ingenious; whereas the one hundred and eighty dramas of Calderon, are said to be monotonous, and to breathe forth the intolerant spirit of the Inquisition. His *Devotion to the Cross*, and *Inflexible Prince*, are mentioned as specimens of his style. The tragedy of *Rachel*, by Garcias de la Huerta, is a later production of superior merit.

The oldest *romance*, worthy of notice, in the Spanish language, if we except the tales of the *Cid*, is said to be that of *Amadis de Gaul;* a tale of chivalry, supposed to have been written about 1300, by Lobeira, a Portuguese. *El Conde Lucanor*, or the Count Lucanor, by Prince Juan Manuel, contains excellent precepts for princes; and is regarded as the first pure model of the Spanish language. *Count Alarcos*, is a tragic novel, the author of which we are unable to name. The comic romance, *Lazarillo de Tormes*, by the statesman Mendoza, and the *Don Guzman de Alfarache*, or Spanish Rogue, by Aleman, are said to have suggested the French novel of Gil Blas, by Le Sage. These were followed by the romances of Timoneda, and Montalvan; of some repute: but the most celebrated Spanish novel is the *Don Quixotte*, of Cervantes; which is at the same time a satire on the absurdities of chivalry, a striking moral picture of human life, and a pure model of the Spanish language. Cervantes wrote another novel, entitled *Persiles and Sismunda;* and an earlier collection of *Exemplary Novels*, or tales, of a moral character. The *Life of Friar Gerund*, by the Jesuit de l'Isla, under the assumed name of Lobon de Salazar, is a spirited satire on the bad preaching of the monks, suggested by Don Quixotte. The *fables* of Yriarte, are possessed of some originality and merit; but in the field of oratory, we believe that the Spaniards have few productions.

Of *Portuguese poetry*, the principal epic is the *As Lusiadas*, (or Os Lusiados), the Lusiad of Camoens; which relates to the discoveries and conquests of his countrymen in the east, particularly those of Vasco da Gama, in his first voyage to India: but it has been observed that Camoens's chief hero was his country. The *Contestabre de Portugal*, by Lobo, is a prosaic poem, the hero of which is Pereira, the High Constable of the kingdom: and the *Naufragio*, by Corte Real, relates to the shipwreck and sufferings of De Sousa, on the coast of Africa. Corte Real also wrote an epic poem on the *Siege of Diu*, (or Dio), and its defence by Mascarenhas. The *Fountain of Aganippe*, by Faria y Souza, is considered inferior; as also the *Henriqueida*, of Meneses count of Ericeyra, in praise of the first king of Portugal. The *Ulysses*, of Castro, and the *Malacca Conquistada*, of Sa y Menesez, are regarded as works of merit; as also the *Ouraguay*, of Basilio da Gama, describing the conquest of Paraguay.

Of Portuguese lyric poetry, the *odes* and *epistles* of Ferreira, have been compared to those of Horace; and are doubtless excellent. Camoens wrote some sonnets and canzonets; and we have recent odes by Manoel; and canzonets by Bocage. The *pastoral* poems of Ribeyro, had many imitators; and led to numerous other works of this class. Falcaô, (or Falcum), was one of his imitators, but his inferior. The pastorals of Andrade Caminha, and Bernardes Pimenta, are still less regarded; and the pastoral romances of Lobo, are said to be very monotonous. The elegies of Bacellar, and the comic poems of Freire de Andrade, are also of minor importance. The *dramatic* poems of Gil Vicente, were probably the best early ones in Portuguese, and served as models not only to Camoens, but also to the two great Spanish dramatists. Camoens wrote the *Amphitryons*, *Seleucus*, and *Filodemo*, or Philodemus, the latter of a pastoral character; and Miranda wrote two Portuguese comedies, *Os Estrangeiros*, or the Strangers, and *Os Villalpandios*, the Villalpands; though his other works, like those of Montemayor, are in Spanish. The tragedy of *Inez de Castro*, by Ferreira, is one of deep interest; and the *Osmia*, of the countess Vimieiro, was crowned by the Portuguese Academy, in 1788. Ferreira de Vasconcellos wrote several comedies of some merit.

Of Portuguese *romance*, next to the *Amadis de Gaul*, written in Spanish by Lobeira, we would mention the *Menina e Moça*, (or Moza), the Innocent Maiden, a chivalric romance by Ribeyro; the oldest prose specimen of the Portuguese language. The *Palmer of England*, by Moraez, and the *Happy Freeman*, by an unknown author, are among the older novels; as also the *Emperor Clarimond*, by Barhas, (or Barros); which, though wanting in invention, is written in a pleasing style. The *History of Charlemagne and his Twelve Peers*, by Carvalho, is bombastic, but amusing; and the *Knights of the Round Table*, by Ferreira de Vasconcellos, is a work of similar character.

§ 2. *French Callography*, may be regarded as commencing with the poetry of the *Troubadours*, or minstrels of Provence, written in the Provençal or Romance language; which, however, differs materially from the modern French. (p. 60). They called poetry the Gay Science; and their short poems, called *sirventes*, *pastourelles*, or *novelles*, treat chiefly of war and love. Such were the productions of William, count of Poitou, called the first Troubadour; and of Thibaut, king of Navarre and count of Champagne, who sang the praises of Queen Blanche of Castile.

The Troubadours appeared in the north of France, about the time of Philip Augustus; and were there called *Trouveurs*, using the Romance-Wallon, or Norman French language. The first of these was Gasse, or Wace, who wrote *Le Brut*, the Romance of Brutus, or the Book of the Britons; a fabulous poetical history of the kings of England, dated 1155. The *Knight of the Lion*, is another romance of the same age, but we know not the author, nor whether it was in prose or in verse. Chretien de Troyes, another trouveur, wrote the *Romance of Saint Gréaal*, a poem on the *holy cup*, from which the Messiah drank during his crucifixion, fabled to have been afterwards carried to England, and owned by the Knights of the Round Table. This, and the poem of *Alexander the Great*, by Alexander de Bernay, Lambert Di Cors, and others, were written about the year 1200. The *Romance of the Rose*, begun by Lorris about 1250, and finished by Meun, or Mehun Clopinel, about 1300, is an allegorical poem on love; of which the title is said to be the most beautiful part. Creuze de Lesser's *Chevaliers de la Table Ronde*, has been praised as a romantic epic of merit.

Of French *epic poems*, the oldest, we believe, is the *Clovis* of Desmarets; rich in conception, but borrowing its incongruous machinery, partly from Christianity, and partly from romance and enchantment. The *Alaric*, or Rome Delivered, of Scuderi; the *St. Louis*, or Holy Crown Reconquered, of Le Moine; the *Pucelle*, or Joan of Arc, of Chapelain; the *Childebrande*, of Saint Garde; the *Moses*, of Saint Armant; and the *Petreide*, of Thomas; are considered as inferior works, which we can here no farther notice.

The principal French epic poem, is the *Henriade*, of Voltaire; describing the events connected with the establishment of Henry IV. on the French throne. It is rich in language, and correct in description; but deficient in inspiration or fervor; and the allegorical personages, introduced in it, produce an unpleasant impression. The *Colombiade*, of Madame du Boccage, describing the introduction of Christianity in America, contains some fine descriptions; but it is deficient in spirit. The *Joseph*, of Bitaubé, is an heroic poem; but the *Pucelle*, of Voltaire, the *Lutrin*, of Boileau, and the *Vert Vert*, of Gresset, are mock heroics, of little worth. Fenelon's *Telemaque*, and Chateaubriand's *Martyrs*, are sometimes ranked as epics, though both written in prose. The former is a work of superior merit.

Of French *lyric poetry*, the *pastourelles* and *rondeaux* of Froissart the chronicler, are of some note; though inferior to the more touching *chansons* of Clotilde du Vallon-Chalys, (Surville by marriage). Of the numerous *poems* of Marot, only a few are worth preserving. Ronsard, Jodelle and Bellay, who with their associates were called the French Pleiades, wrote many *sonnets*, in the Italian style. Desportes was more natural; but inferior to Malherbe, who is regarded as the best of the French lyrists. The *eclogues* of Sarrazan, have some originality; those of Racan, are correct and dignified; the *idyls* of Madame Deshoulières, are tender and spirited; and the eclogues of Segrais pure and natural. The *eclogues* of Fontenelle, are delicate; and the *idyls* of Chenier, and the *elegies* of Bertin, are highly regarded. The *sacred odes*, or psalms, of J. B. Rousseau, are full, and occasionally glowing; as are also the *sacred odes* of Pompignan. The *odes* of Lebrun, and Lamartine, have poetic inspiration; nor can we here omit Madame Dufresnoy, whose *Last Moments of Bayard*, was crowned by the Academy, in 1815. The recent *chansons*, or songs of Beranger, are among the most popular French poems.

Of French *descriptive and didactic poems*, we would mention Brebeuf's *Entretiens Solitaires*, or Solitary Conversations, as one of the earliest of note. The poems by Louis Racine, *La Grace*, and especially *La Religion*, are considered works of merit. Boileau's *Art Poetique*, is highly critical and polished; but wanting in feeling. Voltaire's *Desastre de Lisbonne*, contains some vivid descriptions; but his *Discours sur l'Homme*, or Essay on Man, and his *La Religion Naturelle*, are, we apprehend, works of a dangerous tendency. Dulard's *Grandeur de Dieu*, or Greatness of God in the Wonders of Nature, is a poem of merit. Legouvé's poem, *Le Merite des Femmes*, in praise of women, is full of sensibility and delicacy; *Le Genie de l'Homme*, by Chénedollé, is strong and correct; and *Les Trois Ages*, by Roux, is also a superior work. The *Seasons*, by St. Lambert, and the *Months*, by Roucher, are imitations of Thomson. The poems of Delille, are highly esteemed; and among them are *Les Jardins*, or the Gardens; *L'Homme des Champs*, or the Man of the Fields; *La Malheur et La Pitié*, or Misfortune and Pity; and *La Conversation*. His *L'Imagination*, is rich in description; and his *Poeme de la Nature*, is a work of great erudition. *David*, by Coëtlogon, is a sublime production; as are also

Lamartine's *Mort de Socrate*, or Death of Socrates; and his *Chute d'un Ange*, or Fall of an Angel; which is of a wilder character. Le Brun's poem, *La Nature*, is valuable; and there are also poems on *Theatrical Declamation*, by Dorat; on *Painting*, by Lemierre; on *Astronomy*, by Guidin; on *Navigation*, by Esmenard; and on *Agriculture*, by Rosset. Among the French writers of *satire*, were Boileau, Regnier, Gilbert, and Le Roy. The most noted French *fables*, are those of La Fontaine.

French *dramatic poetry*, may be regarded as commencing with the dialogues of Faydit, and other troubadours, first called comediens. To these succeeded the plays called *mysteries;* representing scripture subjects; but degrading them to the level of the vulgar taste. Next followed the *moralities*, so called; and the *farces* of the Clerks of the Bazoche; and to these succeeded the *follies* of the Lads without care; a society which took this name, and performed comic pieces. The *Captive Cleopatra*, of Jodelle, performed in 1552, was probably the first French Tragedy of note or influence; and his *Dido*, contains great beauties. The *Sophonisba*, of Mairet, and the *Marianne*, of Tristan the Hermit, are less natural; but *La Famine*, by Garnier, exhibits great force. The tragedies of Corneille, excel in force and dignity; though sometimes faulty in the plot. His *Medea*, was his first, and the *Cid*, is considered his best. Racine, is polished and elegant, but wants fire and inspiration. *Les Fréres Ennemis*, the Inimical Brothers, was his first tragedy; but his *Andromache*, and *Athalie*, are regarded as superior. Voltaire, is the third great tragic poet of the French; and his *Zaire*, *Mahomet*, and *Alzire*, have been much admired. The *Rhadamiste*, and other tragedies of Crébillon; the *Omasis in Egypt*, of Baour Lormian; the *Charles* IX., of Chenier; the *Templars*, by Renouard; the *Artaxerce*, by Delrieu; the *Pavia*, of Delavigne; and the *Cromwell*, of Victor Hugo; are tragedies of note, and all that we have room to name.

The oldest French *comedy*, worthy of mention, is the *Avocat Patelin*, first represented about 1480, by the Clerks of the Bazoche. The great comic poet of the French is Molière; whose free invention, and ready humor, have perhaps never been surpassed. *L'Etourdi*, or the Wild Fellow, first gave him celebrity; and his *Tartuffe*, and *Misanthrope*, are said to have become models of the higher comedy. We have farther room to mention only *La Métromanie*, by Piron; *Le Trésor*, by Andrieux; *Le Joueur*, by Regnard; *L'Ami de tout le Monde*, by Le Grande; *Le Méchant*, by Gresset; *Le Glorieux*, by Destouches; and *Les Chateaux en Espagne*, by D'Harleville; as among the best productions of this class. The first French *opera writer*, was Quinault; whose *Armide*, appeared in 1686. The *comic operas*, originated in the *vaudevilles*, or sprightly songs, at the fairs, after the prohibition of comedies, in 1707. Favart first gave them a higher character; and the *Barber of Seville*, and *Marriage of Figaro*, by Beaumarchais, are among the most celebrated.

The earliest French *romances*, in prose, were those relating to King Arthur and the Knights of the Round Table; of which *Tristan de Leonois*, (or *le Lionnais*), by Chretien de Troyes, and *Launcelot* *du Lac*, by Godfrey de Ligny, were written about the year 1200. To these succeeded the romances of Charlemagne and the Twelve Peers of France; one of which, is *The Chronicle*, falsely attributed to Turpin: and another, entitled *Huon de Bordeaux*, was of later origin. The tales of magic and chivalry, called *fabliaux*, were probably borrowed, in part at least, from the Arabs. *Gargantua and Pantagruel*, by Rabelais, is a satirical romance, witty, but coarse. The *Astrée*, or Astrea, of D'Urfé, is a pastoral romance, relating to the court of Henry the Great. The *Grand Cyrus*, and the *Clelia and Cleopatra*, of M'lle. de Scuderi, are said to be feeble and affected; but the historical novels of M'lle. de la Force, are more natural. The *Contes de ma Mère l'Oye*, or tales of Mother Goose, by Perrault, had their day of applause; but the *Princesse de Cleves*, and the *Zayde*, (Zaide), of the Countess de la Fayette, are works of value. The *Gil Blas*, of Le Sage, and his *Diable Boiteux*, have been much admired; but the *Candide*, and *Zadig*, of Voltaire, are more satirical and misanthropic. The *Nouvelle Heloise*, and the *Emile*, of J. J. Rousseau, display the weak character of their author: but the *Marianne*, of Marivaux, is refined and natural; and the *Belisaire*, of Marmontel, is said to be good. The *Paul and Virginia*, and the *Indian Cabin*, of St. Pierre; and the *Atala*, *René*, and *Martyrs*, of Chateaubriand, are extensively admired. The *Corinne*, and *Delphine*, of Madame de Staël; the *Siege of Rochelle*, and *Adela and Theodore*, of Madame de Genlis; the *Elisabeth*, and *Mathilde*, of Madame Cottin; and the *Caroline de Lichtfield*, of Madame de Montolieu; are also worthy of mention, and are all that we have room to name. Of French *epistles* or letters, we barely name those of the Marchioness de Sevigné; of M'lle. de l'Espinasse; and of Madame Deffand; as models and specimens. The *essays* of Montaigne, and the *funeral orations* of Bossuet, are very highly esteemed.

§ 3. *British Callography*, we are proud to say, is rich and unsurpassed in every important class of polite literature. English poetry, may be considered as originating with Spenser and Gower, and reaching its acme with Shakspeare and Milton. Chaucer's *Court of Love*, is the oldest English poem extant; and his *Canterbury Tales*, resemble those of the Troubadours. Gower's *Confessio Amantis*, or Confession of a Lover, written in Latin, was one of the first books printed in England. Spenser's *Fairy Queen*, a tale of magic and chivalry, has great beauties, though incomplete, and seemingly deficient in unity. It is a series of allegories, in praise of the virtues; rich in imagination, facile in diction, and abounding in romantic incident, sublimity, and pathos. Davenant's *Gondibert*, is also a romantic poem of considerable interest. Dryden's *Palamon and Arcite*, is a tale of Grecian times; and Thomson's *Castle of Indolence*, is an allegorical poem, in imitation of Spenser.

The poem of Giles Fletcher, which might be entitled the *Messiad;* including Christ's Victory in Heaven, Triumph on Earth, Triumph over Death, and Triumph after Death; may be ranked as an heroic poem of merit: but the chief *epic poem*, in our language, is Milton's *Paradise Lost;* which describes, in the sublimest strains, the disobedience of our first parents, with its deplorable consequences, and the promised restoration of our race to the Divine favor. Milton's *Paradise Regained*, relating to the events of our Saviour's life, has less inspiration, and is less admired. Blackmore's poem on the *Creation*, is elaborate, but tame; and his *Prince Arthur*, and *King Alfred*, are heroic poems of minor note. The *Leonidas*, of Glover, is a respectable production; but, like the *Epigoniad*, of Wilkie, has fallen into neglect. The *Fingal and Temora*, attributed to Ossian, but collected and compiled by Macpherson, may be regarded as an epic poem, relating to the deliverance of Erin from Swaran, king of Lochlin, by Fingal, the father of Ossian.

Of English *lyric poetry*, other than psalms and hymns, we would mention Drummond's *sonnets*, and Habington's poems to *Castara*, as among the earliest and best. The odes and other poems of Cowley and Waller, we cannot admire. Dryden's *Alexander's Feast*, an ode for St. Cecilia's Day, is masterly; and superior to those of Addison, and Congreve, on the same theme. Pope's *Messiah*, a sacred eclogue, and his *Universal Prayer*, are noble productions. Collins's *Ode on the Passions*, is of the first order: and some of Gray's odes, as his *Hymn to Adversity*, are, we think, superior. T. Warton's ode on the *Crusade*, and Mason's odes, to *Memory*, and to *Independence*, are worthy of praise; as also Mrs. Barbauld's ode to *Remorse*. Wordsworth's *Lyrical Ballads*, have found strong admirers; and Coleridge's *Sibylline Leaves*, contain many good poems of a lyrical character. Bowles's *Sonnets*, are also good; but Burns's *Scottish Songs*, and Moore's *Irish Melodies*, are among those collections which have met with the most general favor. Mrs. Hemans's *poems* belong mostly to this class, and deserve high praise. Of *elegiac poetry*, we would mention Lord Lyttelton's *Monody* on the death of his wife; Shenstone's *Elegy* on a melancholy event; and Gray's *Elegy*, written in a country churchyard; as models of their kind. Of *pastoral poetry*, Spenser's *Shepherd's Calendar*, and Wither's *Shepherd's Hunting*, are among the oldest specimens of interest. *Brittannia's Pastorals*, by Browne, are quaint, but original; Gay's *Shepherd's Week*, descends to rustic themes and style; but Shenstone's *Pastoral Ballad*, is a truly elegant production. Lyttelton's *Progress of Love*, in four eclogues, is ornate and attractive; and Allan Ramsay's *Gentle Shepherd*, is a beautiful picture of Scotch pastoral life. Collins's *Oriental Eclogues*, finely describe Asiatic pomp; and the *City Eclogues*, of Lady Montague, assisted by Pope, and Gay, present a striking picture of city life.

Of English *descriptive poetry*, Drayton's *Poly-olbion*, is a minute description of England, with many striking episodes. Phineas Fletcher's *Purple Island*, is an allegorical description of man, physically and mentally considered. Milton's *L'Allegro*, and *Il Penseroso*, are vivid pictures of cheerfulness and melancholy. Gay's *Trivia*, or walking in London, and his *Rural Sports*, like Somerville's *Chase*, and *Field Sports*, and Savage's *Wanderer*, are respectable poems of this class. Goldsmith's *Traveller*, and *Deserted Village*, are peculiarly beautiful; and Pope's *Windsor Forest*, Dyer's *Grongar Hill*, Denham's *Cooper's Hill*, and Roscoe's *Mount*

Pleasant, are charming descriptions. Dyer's *Ruins of Rome*, Addison's *Letter from Italy*, and especially Rogers's *Italy*, are choice and instructive poems. Falconer's *Shipwreck*, is a well drawn and affecting picture; and the same may be said of Campbell's *Gertrude of Wyoming*. Bloomfield's *Farmer Boy*, though simple, has excited much interest; and Burns's *Cotter's Saturday Night*, is one of our sweetest poems. Wordsworth's *Excursion*, and Grahame's *Sabbath*, and *Sabbath Walks*, are fine productions; and Parnell's little poem, the *Hermit*, should not be forgotten. Thomson's poem on the *Seasons*, is natural and beautiful; and Akenside's *Pleasures of the Imagination*, Rogers's *Pleasures of Memory*, and Campbell's *Pleasures of Hope*, cannot fail to be read with pleasure and improvement. The *Triumph of Peace*, and the *Empire of Neptune*, by Hughes, like the *Brittania*, and the poem on *Liberty*, by Thomson, are national or patriotic poems of merit. Dryden's *Astræa Redux*, and *Absalom and Achitophel*, are in praise of Charles II.; his *Annus Mirabilis*, treats of the Great Fire in London, and the Dutch War; and Addison's *Campaign*, describes the battle of Blenheim.

Of English *didactic poetry*, Tusser's *Good Husbandry*, is one of the oldest specimens, quaint but valuable. Gascoigne's *Fruits of War*, is well argued and noble; and Greville's (Lord Brooke's) poem on *Human Learning*, is one of merit; as also Daniel's *Musophilus*, in defence of learning. The *Immortality of the Soul*, by Davies, is an admirable argument; and Prior's *Alma*, or Progress of the Mind, is a popular poem, superior to his *Solomon*, or the Vanity of the World, which is wanting in force. The *Spleen*, a poem by Green, gives good directions for preserving cheerfulness; and Armstrong's *Art of Preserving Health*, is an excellent treatise on Hygienics. John Philips's *Pomona*, a poem on Cider, is amusing and practical; and Darwin's *Botanic Garden*, is worthy of the horticulturist's perusal. Pope's *Essay on Criticism*, is superior; and Churchill's *Rosciad*, is a good criticism on theatrical performances. Ambrose Philips wrote a poem on *Education;* and Stillingfleet one on *Conversation*. Pope's *Essay on Man*, has been widely read; and his *Moral Essays*, are rich in thought and diction. Cowper's *Task*, is a valuable and instructive poem; and Beattie's *Minstrel*, is noble and sublime. Young's *Complaint*, or Night Thoughts, is a deeply pious production; and Pollok's *Course of Time*, is a lofty flight of genius. The poems of Heber, White, and Miss Hannah More, are chiefly didactic, and very beautiful. Of *satirical poetry*, Butler's *Hudibras*, in ridicule of the dissenters in Cromwell's time, is witty, but coarse and vulgar. Pope's *Dunciad*, and Gifford's *Baviad*, and *Mæviad*, are satires on bad, but conceited writers. Byron's *English Bards and Scotch Reviewers*, is a similar satire, but unjustly severe. Young left seven satires on the *Universal Passion*, or the love of fame. The satires of Wolcot, (Peter Pindar), against George III., are of little worth.

Of English *dramatic poetry*, the great and early master is Shakspeare; whose truth to nature and richness of imagination have probably never been surpassed. Of his *tragedies*, we would mention *Romeo and Juliet*, *Hamlet*, *King Lear*, *Macbeth*, and *Othello;* and of his lighter pieces, the *Tempest*, and *Midsummer Night's Dream*, as among the best. Of Ben Jonson, Shakspeare's worthy contemporary, the best dramas are the *Alchemist*, *Epicene*, and *Volpone;* full of energy and humor. Beaumont and Fletcher, wrote many plays, but very few of them can be recommended for perusal. Milton's *Comus*, and *Samson Agonistes*, are worthy of his fame. Dryden's *All for Love*, and his *Don Sebastian*, are energetic, but rather bombastic. Otway's *Orphan*, and his *Venice Preserved*, are deep tragedies, though obnoxious to criticism. Lee's *Theodosius*, is rather extravagant; but Rowe's *Jane Shore*, and his *Fair Penitent*, are noble and spirited productions. Congreve's *Mourning Bride*, has considerable merit. Dr. Young's *Revenge*, is energetic, but deeply tragic. Addison's *Cato*, is beautiful, though rather frigid; and Thomson's *Tancred and Sigismunda*, has the same fault. Home's *Douglas*, is a tragedy of great merit. We have farther room to name only Sheridan's *Pizarro;* Moore's *Gamester;* Miss Hannah More's *Percy;* Brooke's *Gustavus Vasa;* Cibber's *Ximena;* and Hughes's *Siege of Damascus;* as superior tragedies: and of comedies, Dodsley's *King and Miller of Mansfield;* Goldsmith's *She Stoops to Conquer;* Hoadley's *Suspicious Husband;* and Sheridan's *Rivals;* may be added as works of note. Gay's *Beggar's Opera*, is among the famed productions of its class.

Of English *romantic poetry*, we have spoken in part at the commencement of this section. Crabbe's collection of *Tales*, is generally interesting; and Prior's *Henry and Emma*, is a sweet poem of its kind. So is Goldsmith's *Edwin and Angelina.* Most of Sir Walter Scott's poems are of this class; as *The Lay of the Last Minstrel; Marmion; The Lady of the Lake; The Vision of Don Roderick; Rokeby; The Lord of the Isles;* and others of minor note. Here also we would class many of Byron's poems, as *Childe Harold's Pilgrimage; The Giaour; The Bride of Abydos; The Corsair; Lara; The Siege of Corinth; The Prisoner of Chillon; Beppo; Mazeppa;* and others. Next to these we mention Southey's poems, *Thalaba; Madoc; The Curse of Kehama;* and *Roderick.* Moore's *Lalla Rookh*, and *Loves of the Angels*, are imaginative and pleasing: and Wordsworth's *Peter Bell*, and his *Waggoner*, are tales of interest. We have only room to name farther Shelley's *Revolt of Islam*, and *Alastor;* Keats's *Endymion*, and *Isabella;* Montgomery's *Wanderer of Switzerland;* Bowles's *Missionary;* Miss Landon's *Improvisatrice*, and *Troubadour;* Coleridge's *Rime of the Ancient Mariner*, and *Christabel;* and Professor Wilson's *City of the Plague*, and *Isle of Palms;* as prominent poems of this class.

The earliest romances, relating to, or written in England, were in the French language, introduced by the Norman conquerors; and have been referred to under French Callography. (p. 298). The oldest one, not translated from the French, is probably the metrical romance of *Sir Tristram*, by Thomas of Ercildoun; which has been edited by Sir Walter Scott. The Romances relating to Arthur and Charlemagne, were followed by those called classical, applying ancient names to the characters and manners of the crusaders. Sir

Philip Sidney's *Arcadia*, is a pastoral romance, of great beauty; but Sir Thomas More's *Utopia*, describing an imaginary land of perfection, had a political object. Boyle's *Parthenissa*, and Mrs. Manley's *Atalantis*, were perhaps the first English novels relating to the fashionable life of their times. Richardson's novels, *Pamela*, *Clarissa Harlowe*, and *Sir Charles Grandison*, are attempts to paint perfection; but have considerable merit. Fielding's novels, including *Tom Jones*, and Smollet's novels, including *Roderick Random*, portray scenes of common and low life with force, but too often descend to vulgarity. Dr. Johnson's *Rasselas*, is a philosophical tale; and Goldsmith's *Vicar of Wakefield*, is natural and beautiful; one of the best works of its kind. Of Sterne's *Tristram Shandy*, we think less favorably. Mrs. Radcliffe's novels, including the *Mysteries of Udolpho*, and the *Italian*, are chiefly tales of terror; and still worse are M. G. Lewis's *Ambrosio or the Monk*, Walker's *Three Spaniards*, and Maturin's *Melmoth or the Wanderer*. Mrs. Roche's novels are chiefly sentimental; of which the best is perhaps the *Children of the Abbey*. Miss Jane Porter's *Thaddeus of Warsaw*, and *Scottish Chiefs*, are pleasing compositions; perhaps superior to the *Don Sebastian*, and other novels, of Miss Anna Maria Porter, her sister. *Evelina*, *Camilla*, and other novels by Miss Burney, (Mrs. Darblay), and especially Miss Edgeworth's novels, including *Belinda*, and *Helen*, are superior in style and sentiment. Mrs. Hofland's novels, including the *Son of a Genius*, are beautiful and instructive. D'Israeli's *Vivian Grey*, and *Young Duke;* Bulwer's *Devereux*, *Rienzi*, and other novels; and Marryat's *Peter Simple*, *Jacob Faithful*, and other productions, are powerful descriptions, but of doubtful tendency. Of James's novels, *Darnley*, *Philip Augustus*, *Richelieu*, *Attila* and others, we think favorably; but the great novelist of our language is Sir Walter Scott; of whose novels, more than five-and-twenty in number, *Guy Mannering*, *The Antiquary*, The *Heart of Mid Lothian*, and *Ivanhoe*, are among those which we prefer.

Of English essays, those found in Johnson's *Rambler*, and *Idler;* in Addison's *Spectator;* in Mackenzie's *Mirror*, and *Lounger;* and in Cumberland's *Connoisseur*, are among the more celebrated. The letters of Lord Shaftsbury and Mr. Harris are philosophical treatises. Those of Pope are rather pedantic; those of Swift unaffected, but they show his character in no favorable light. The letters of Bolingbroke, of Dr. Arbuthnot, and of Bishop Atterbury, are said to be superior. Cowper's letters are beautiful, and exhibit an attractive character. As prominent British orators, we would name Chatham, Pitt, Fox, Burke, and Sheridan among the statesmen; and Knox, Tillotson, Butler, Sherlock, Barrow, Heber, Hall, and Chalmers, among the divines.

§ 4. Of *Dutch Callography*, which is limited in extent, and of minor importance, we must speak very briefly. The first poets of note, in the Dutch language, were Van Der Doos, (or Douza), who wrote the *Annals of Holland* in verse; and the Heinse, (or Heinsius, father and son), who wrote however chiefly in the classic tongues. The poems of Cats are said to be spirited and pious; those of Van

Der Goes, elegant and correct. Of Dutch *epic poems*, we may mention the *Adam and Eve*, of Van Der Vondel; who also wrote satires, eulogies, and tragedies. The *William* III., is an epic poem by Rotgans; and another entitled *Germanicus*, is by an unknown authoress. Van Der Vleit wrote a poem entitled *The Spaniards in Rotterdam*, chiefly historical. The *odes* of Van Brœckhuyzen, and Moonen, and the *idyls* of Wellekens, are much esteemed; as are also the poems of Poot and of Nieuwland.

German Callography, is chiefly the growth of recent times; during which, sound criticism has secured to it a confirmed national character. The *heroic songs* of the ancient Germans, mentioned by Tacitus, and sung in the days of Attila, are lost. Of the biblical poems, which originated with the introduction of Christianity, Ottfried's *Harmony of the Gospels*, written in verse, in the time of Lewis the German, is the most important. To these poems succeeded those of the *Minnesingers*, or amatory poets, the first of whom was Henry of Veldeck, already mentioned under Biography. They are also called *Suabian poets;* because they flourished under the Suabian or Hohenstaufen dynasty, and wrote in the Suabian dialect. They were mostly knights or nobles, and sang chiefly of virtuous love, in connection with chivalric and pastoral themes.

The oldest *epic poem*, of the Germans, is the *Nibelungenlied*, or song of the Nibelungs; narrating the tragic fate of Günther, an ancient chief of the Nibelungs, (a tribe of Burgundians), with the destruction of that tribe, about A. D. 440. Next to this, is the *Heldenbuch*, or book of heroes, also arranged and compiled by the Minnesingers, and relating to the times of Attila and the irruption of the Germans into the Roman empire. The *Teuerdank*, by Pfinzing, is a romantic epic, of which the emperor Maximilian I. is the hero. The *Oberon* of Wieland, is a romantic epic, founded on a tale of chivalry, in which fairies and elves are introduced as the machinery. Bürger's *Leonora*, is a similar composition, in which ghosts and sorcerers perform a part. Goethe's *Hermann and Dorothea*, is rather a tale, than an epic poem; but of deep interest. Schulze wrote *The Enchanted Rose*, and *Cecilia*, classed as romantic poems approaching the epic character. Gessner's *Death of Abel*, is a beautiful epic or rather descriptive composition, though written in prose: and the *Messiad*, by Klopstock, relating to the life of our Saviour, is said to be full of sublime inspiration.

Of German *lyric and pastoral poetry*, the *hymns* and sacred poems of Martin Luther and his successors, animated and vigorous, fluent and original, served as a model of the German language. There are said to be more than thirty thousand hymns in this language, by more than five hundred authors. The *sacred odes*, or psalms, of Klopstock, are of a high order; the *hymns* of Gerhard are full of deep piety, and those of Novalis, have much feeling and spirit. The lyrical poems of Opitz, are said to want originality, but are well written. The *idyls* of the Swiss Gessner, are characterized by purity and truth; and those of Voss are beautiful, particularly that entitled *Louisa*. The *elegies* of Hölty, are said to be in a romantic vein; but the *war songs* of Körner, breathe the loftiest strain of feeling and of patriotism. We have also beautiful *ballads*, or lyrical compositions, by Goethe, Schiller, Herder, Uhland, and others; and the *Minnelieder*, or love-songs of the Minnesingers, have been collected by Tieck. The *Urania* of Tiedge is said to be of a lyrical and didactic character. Haller's poem on *The Alps*, is a fine description; and his ethical poems are of great value. Hagedorn's poem *On Happiness*, contains excellent morality; and his *fables* are superior. Gellert also wrote fables, and didactic poetry. Kleist's *Vernal Season*, is said to be a fine production. Among the earlier *satirical poems*, are *Reinecke der Fuchs*, or Reynard the Fox, by Henry of Alckmaer; the *Narrenschiff*, or Ship of Fools, by Sebastian Brand; and other similar productions.

German *dramatic poetry*, originated with the *Mastersingers;* who formed poetical fraternities in some of the German cities, about the middle of the fourteenth century. Their first productions were religious poems; but Hans Rosenplüt, Hans Folz, and especially Hans Sachs, wrote numerous pieces for the theatre. Among those of Folz, are *Solomon und Marcolf*, and *Der Arzt und der Kranke*. The dramas of Gottsched, are said to be formal and inferior. Lessing, who wrote didactically on the theatre, is the author of *Sarah Thompson*, a tragedy, and *Minna von Barnhelm*, a military comedy. The tragedies of Schiller, including his *Mary Stuart*, *Wallenstein*, and *William Tell*, are among the best in the German language. Uhland's *Duke Ernest of Suabia*, and *Louis of Bavaria*, are respectable dramas. The tragedies of Werner, including his *Luther*, and *Attila*, are much esteemed; but those of Goethe are perhaps the most read; including his *Gortz von Berlichingen; Faust; Iphigenia; Count of Egmont;* and *Tasso*. The dramas of Kotzebue, mostly comedies, are regarded as inferior.

Of German *romantic poetry*, besides the romantic epics already named, some of the most popular productions are the *Melusine;* and *Magalone;* and the famous *Till Eulenspiegel*, or German rogue, which last has been attributed to Dr. Murner, but is probably of an earlier date. Herder's romantic poems, including the *Cid*, *Voices of the Nations*, and *Legends*, are highly praised; but those of Wieland, among which are *Gandolin*, *Endymion*, and *Ganymede*, are, to say the least, highly extravagant. Lessing's *Nathan the Wise*, is, we believe, a poem of the romantic kind. Goethe's *Hermann and Dorothea*, is much admired; and the romantic poems of Schwab, and Tieck are said to be superior.

Of *German romance*, in prose, many specimens have been handed down from the days of chivalry; which we have no room to mention. Lohenstein's *Arminius and Thusuelda*, is said to be vigorous, but bombastic and conceited. The Swiss physician Haller, wrote three political novels in German, entitled *Usong; Alfred the Great;* and *Fabius and Cato;* designed to compare the different forms of government. Gellert's *Swedish Countess*, was the first German novel devoted to a description of domestic life. Wieland, besides his romantic poems, wrote several novels in prose; of which his *Agathon*, is the best known; though its philosophy should be received with caution. Engel's *Lorenz Stark*, is a masterly picture of life and manners; and the *Alcibiades*, and *Bianca Capello*, of Meissner, are striking and elegant. Nicolai's *Sebaldus Nothanker*, and other novels, are less esteemed. Jung's *Theobald der Schwärmer*, is mystical and unnatural; and *Heinrich von Ofterdingen*, by Novalis, is a similar work, though in a lofty style. Miller's *Sigwart*, is a sentimental novel; but Pestalozzi's *Lienhardt und Gertrude*, describes humble life with truth and feeling. The *Hesperus*, *Titan*, and other novels of Paul Richter are both moral and entertaining. Goethe's *Wilhelm Meister*, and *Sorrows of Werter*, have been much read; and Kotzebue's *Ildegerte* and *Zaida*, are worthy of mention, though less admired.

The earliest *Danish poets*, were the *Scalds*, or minstrels, who sang, in blank verse, the exploits of their leaders, and the praises of their nation. The oldest Danish poem extant, is the epic of the *Skyldingians;* which belongs to the age of chivalry. The modern poetry of the Danes, may be said to have commenced with Arreboe, in the beginning of the seventeenth century. Kingo celebrated the exploits of the *Danish Kings*, in an heroic poem; and Ingemann has written an allegorical epic, entitled *The Black Knights*, resembling Spencer's Fairy Queen. The epic poem by Herz, on the *Deliverance of Israel*, obtained a prize from the society of the fine arts; and Ewald's *Death of Balder*, is also a work of genius. The *lyric poems* of Ewald, Weyer, Brun, and Baggesen, are said to be superior; as also the *comic* and *satiric* poems of Holberg, Guldberg, and Wessel.

The *Danish tragedies* of Rahbeck, and Weyer, are said to be good, and the *Rolf* of Ewald, is a work of genius. The tragedies of Œhlenschläger, including *Hakon Jarl*, *Planatoke*, and *Axle and Walburg;* as also Ingemann's *Massaniello*, and his *Blanca*, are highly celebrated. Of Danish comedies, those of Holberg, and Wessel, are said to be the best. Holberg is regarded as the first of the modern Danish literati. His *Peder Paars*, a comico-heroic poem, first established his fame; and his *Nicholas Klimm's Subterraneous Travels*, a satirical and humorous romance, has been extremely popular.

Here perhaps should be mentioned the *Edda*, a mythological and heroic poem, or rather collection of poems, said to have been composed by the Norwegians in Iceland, as early as A. D. 1100; and from which an abridgment or digest, called the *Younger Edda*, was afterwards made by Snorro Sturleson. Among those parts of it which have been published, are the *Voluspae*, or prophecies, and *Havamaal*, or elevated conversation.

Of the early *Swedish poetry*, chiefly songs of the Scalds, few specimens remain; and the chief literature of this country is very recent. The national taste has been improved by a society called the *Friends of Science*, founded at Upsal, by Atterbom, in 1803. Dalin wrote entertaining poems, in the French style; and Madame Nordenflicht's *lyrics* gained her the title of the Swedish Sappho. The poems of Lidner, have much feeling and elevation; and those of Thorild, are of a noble character. The *lyrics* of Bellman, are said to be unsurpassed, and his descriptions of Swedish life and manners very correct. Atterbom opposed the French style, in some minor poems of merit.

The *lyric* and *pastoral* poems of Tegner, display high genius; Francen's *idyls* are worthy of mention; and the *Dikter von Euphrosyne*, by C. Julia Nyberg, are lyric poems replete with tenderness and beauty.

Gyllenborg wrote an *historical epic* poem, in the Swedish language, entitled *Taget öfver Bält*, as also a didactic poem, *Forsök om Skaldeconsten*, both of which are highly praised, The *drama*, in Sweden, has been but little cultivated. Ling is perhaps the best dramatic poet; and his *Agnes*, has some striking passages. Of Swedish novels, those of Livijus, including his *Knight of St. Jörrn*, and *Pique Dame*, are perhaps the best. Those of Mörk, among which are *Adalrik and Gothilda*, and *Thekla*, are also deemed worthy of mention; and these are all that we have room to name.

§ 5. Of *Polish Callography*, the oldest and finest monument are the works of Kochanowski, including psalms, elegies, epigrams, and a didactic poem on chess. The *lyrics* of Grochowski, the *idyls* of Simonowicz, the *odes* of Woronicz, and the odes and *elegies* of Karpinski, are highly esteemed. Of *epic poems*, the Poles have the *Jagellonida*, by Tomascewski, on the Union of Lithuania with Poland; and the *Monomachy*, or War of the Monks, by Krasicki, archbishop of Guesna. Krasicki also wrote the *Mycheid*, or Souriad, a mock heroic, which relates how mice and rats devoured king Popiel; and the *War of Choczin*, which is rather historical than epic. Trembecki was distinguished as a lyric, fabulistic, and didactic poet; Zachowitsch, for his fables and tales; and Niemcewicz, for patriotic songs. Poland has numerous dramatic poems, among which are those of Bielawski, Zablocki, Felinski, Osinski, and others. Boguslawski's *Krakowiani i Gorali*, is an interesting drama, from the number of its patriotic songs. There are Polish *romances*, by Skarbeck; and the *Jan. Y. Tenczyna*, of Niemcewicz is an historical novel, in imitation of those of Scott.

Of *Russian Callography*, one of the older specimens is the *Expedition of Igor*, an heroic poem written in the twelfth century. Lomonosoff wrote an epic, entitled *Peter the Great;* and Keraskoff wrote two epics, the *Conquest of Kasan*, and *Wladimir the Great;* which are said to be deficient in interest, though well written. Petroff's national *odes*, and Batjuschkoff's *lyrics* and *elegies*, display fine taste and imagination. Derschawin's *Ode to the Deity*, and his *Waterfall*, are poems of great merit. Dmitrieff wrote odes, and fables; the latter imitated from La Fontaine. The *fables* of Chemnitzer, and of Kriloff, are original, and highly esteemed. Keraskoff wrote, besides his epics, a didactic poem called *Fruits of the Sciences;* and Bagdanowitsch wrote a romantic poem, entitled *Psyche;* the idea of which was borrowed from the classics. The *theatre*, was introduced into Russia, in 1758. Sumarokoff wrote the first regular tragedy; and those of Oseroff are high in public favor. The older Russian *tales*, relate chiefly to *Wladimir* I. and his knights; who are to the Russians what Charlemagne was to the French, and Arthur to the British. Of the Russian *novelists*, we can only name Karamsin, Shukoffsky, and Benizky.

CHAPTER IV.

AMERICAN CALLOGRAPHY.

The Polite Literature of the United States, though limited in extent, is, we think, not unworthy of a youthful nation. The subjugation of a new country, the development of its physical resources, and the acquisition of property, have necessarily preceded the cultivation of that taste in the fine arts, which wealth and leisure alone can foster, and without which, genius must languish in obscurity and neglect. But we indulge the hope that henceforward, wealth and leisure will be less devoted to gaudy show; and that taste and genius will be more highly appreciated, and more adequately rewarded, by those who possess the requisite means. We may remark that although less polite literature might have been written, perhaps even more of it might have been preserved, by our countrymen, had not our language been so rich already in this department.

Of American *epic poetry*, Dwight's *Conquest of Canaan*, describing the establishment of the Jews in the Holy Land, is perhaps the oldest and best specimen. Barlow's *Vision of Columbus*, which was afterwards enlarged under the title of the *Columbiad*, is, we think, a poem of considerable merit, on the Discovery of America, and the future glory of the United States. The *Fredoniad*, by Emmons, describing at large the events of the Last War with Great Britain, falls below the dignity of an epic poem, and has been but little read. Adams's *Madoc*, relating to a Welsh prince of that name, who is supposed to have discovered America, is a dignified poem, but has not met with general attention. Trumbull's *Mac Fingal*, is a mock heroic poem, written in favor of the Revolution; and the *Anarchiad*, by Lemuel Hopkins and others, was designed to further the adoption of the Federal Constitution.

Of American *lyric poetry*, the patriotic songs of Hopkinson and others, had a marked influence during our struggle for Independence. The *Adams and Liberty*, of Robert Treat Paine, and especially the *Hail Columbia*, of Judge Hopkinson, are among those happy efforts which have acquired a national renown; and next and similar to them we would mention the *Star Spangled Banner*, by Francis Key, and the *American Flag*, by Drake, as among the noblest effusions of patriotism. Humphrey's *Address to the Revolutionary Army*, and other patriotic poems; Freneau's *Address of Columbus to Ferdinand;* and Ladd's *Address to the Sun*, a Runick Ode; are among the older and valuable specimens of American poetry. We would mention Percival's *Ode to Music*, and *Ode to Freedom;* Bryant's *Forest Hymn*, *Hymn to Death*, and *Thanatopsis;* Sprague's *Shakspeare Ode;* Halleck's *Marco Bozzaris;* Brooks's *Greece;* Everett's *Alaric;* Mrs. Sigourney's *Napoleon's Epitaph*, and *Lady Jane Grey;* Dana's *Dying Raven;* Woodworth's *Bucket;* Willis's *Confessional*, and *Table of Emerald;* Brainard's *Epithalamium;* Whittier's *New England;* Peabody's *Hymn of Nature;* Clark's *Last Prayer of*

Queen Mary; Mellen's *Bugle;* Dawes's *Spirit of Beauty;* Pierpont's *Airs of Palestine;* and Longfellow's *Voices of the Night;* as worthy specimens of poetry, chiefly lyrical.

Of American *descriptive*, and *didactic poetry*, one of the oldest specimens is Folger's *Looking Glass for the Times*, written as early as 1676. Wigglesworth's *Day of Doom*, created a strong sensation; but Godfrey's *Court of Fancy*, attracted little notice. R. T. Paine's *Invention of Letters;* Linn's *Powers of Genius*, and *Valerian;* and Lathrop's *Vision of Canonicus*, are valuable works. Dr. Dwight's *Greenfield Hill*, is a beautiful poem of this class. Barlow's *Hasty Pudding*, and his *Conspiracy of the Kings*, are, we believe, of a satirical or political character. Livingston's *Philosophical Solitude*, has met with little notice. Trumbull's *Progress of Dullness*, and Dwight's *Triumph of Infidelity*, are satirical poems of a high character. Osborne's *Thanksgiving*, is a touching description of that social New England festival. Mrs. Sigourney's *Zinzendorf*, relates to a nobleman of that name who became a Moravian Missionary to the Indians. Hillhouse's *Vision of Judgment*, and Mellen's *Martyr's Triumph*, are sublime productions; and Bryant's *Ages*, exhibits the power and purity of its author. Percival's *Voyage of Life*, and *Consumption*, are also excellent. Lunt's poem on *Life*, and Bacon's on *Man*, are, we think, worthy of mention. Of *Romantic poems*, we would name Percival's *Wreck*, his *Prometheus*, and *The Suicide;* Halleck's *Fanny* and *Alnwick Castle;* Drake's *Culprit Fay;* Willis's *Melanie;* Dawes's *Geraldine;* Mitchell's *Indecision;* Miss Davidson's *Amir Khan;* and, we believe, Dana's *Bucaneer*, Whittier's *Minstrel Girl*, and Sand's *Yamoyden*. Everest's *Babylon;* Hill's *Ruins of Athens;* and Rees's *Battle of Saratoga;* are, we believe, descriptive poems. Several of Willis's scriptural poems, as *Jephthah's Daughter*, and *Hagar in the Wilderness*, are beautifully descriptive and didactic; and this character belongs generally to the poems of Mrs. Sigourney and Bryant.

Of American *dramatic poetry*, the first specimen was probably the *Prince of Parthia*, by Thomas Godfrey, Jr.; and next to it was Leecock's *Disappointment*, a comic opera, printed in 1767. Mrs. M. Warren, of Boston, wrote *The Adulateur*, *The Group*, *The Blockheads*, and *The Motley Assembly;* political plays, during the Revolution. Her tragedies, the *Sack of Rome*, and the *Ladies of Castile*, we believe, were written at a later date. W. Dunlap wrote or translated nearly fifty pieces, including *The Archers* of Switzerland, the *Voice of Nature*, and *André*, a tragedy, founded on the fate of Major André. Colonel Humphreys wrote the *Widow of Malabar*, a tragedy, from the French; and Rev. John Blair Linn wrote *Bourville Castle*, and we believe other dramatic pieces. We must not omit to notice Lathy's *Reparation*, a comedy; D. Everett's *Daranzel;* W. Jones's *Independence;* W. C. White's *Clergyman's Daughter*, and *Poor Lodger;* J. N. Baker's *Marmion*, and *Superstition;* C. J. Ingersoll's tragedies, *Edwy and Elgiva*, and *Julian;* and D. P. Brown's *Sertorius*, and *Prophet of St. Paul's*. Among other works of merit are Willis's *Tortesa, the Usurer;*

Epes Sergeant's *Velasco;* and especially Dawes's *Athenia of Damascus:* but the tragedies of Hillhouse, called *Hadad, Percy's Masque,* and *Demetria,* are perhaps the best which our country has yet produced.

Of American *Romance,* in prose, the first production appears to have been *The Foresters,* by Dr. Belknap of Boston, first published in 1787, in the Columbian Magazine, Philadelphia. It relates to our colonial history, and may be regarded as a continuation of Arbuthnot's John Bull. Tyler's *Algerine Captive,* published in 1797, is a genuine novel, though founded on facts. The first professed novelist, Charles Brockden Brown, wrote *Wieland, Ormond, Arthur Mervyn, Edgar Huntley, Clara Howard,* and *Jane Talbot;* works of genius and merit, though not of the most recent school. Washington Irving's *Knickerbocker's History of New York;* and his *Jonathan Oldstyle's Letters, Salmagundi, Sketch Book, Bracebridge Hall, Tales of a Traveller,* and *Alhambra,* are also classed as works of fiction, and are unsurpassed in style and character. Wirt's *Old Bachelor,* and *British Spy,* are also standard works of this class. Dennie's *Female Quixotism;* Mrs. Foster's *Boarding School,* and *Coquette;* and Mrs. Rowson's *Rebecca,* and *Sarah,* have met with less notice. Cooper's novels, have been generally read and admired; particularly *The Spy, The Pioneers, The Pilot, The Last of the Mohicans, The Prairie,* and *The Red Rover.* We would also mention Paulding's *Dutchman's Fireside,* and *Westward Ho!;* Flint's *Francis Berrian;* Kennedy's *Swallow Barn,* and *Horseshoe Robinson;* Bird's *Hawk of Hawks Hollow, Calavar,* and *Peter Pilgrim;* Ingraham's *Southwest, Lafitte,* and *Burton;* Simms's *Yemassee, Guy Rivers,* and *Mellichamp;* Fay's *Norman Lesley,* and *Countess Ida;* Tuckerman's *Isabel or Sicily;* and Longfellow's *Hyperion;* as worthy specimens of American romance, generally evincing talent and taste. Miss Sedgwick's *New England Tale, Redwood, Hope Leslie, Clarence,* and *The Linwoods,* are beautiful and natural; and her recent minor tales are fraught with excellent instruction. The *Hobomok, Rebels,* and *Wilderness,* of Mrs. Child, (formerly Miss Francis); as also Miss Leslie's *Pencil Sketches,* and *Althea Vernon,* are entertaining productions; the last of this class which we have room to name.

Among the best productions of American *eloquence,* it is to be regretted that most of the speeches of Patrick Henry, Edmund Randolph, James Otis, Samuel Adams, and other Revolutionary worthies, have not been written out and preserved. Those of Fisher Ames, Hamilton, and Jefferson, are, we believe, mostly published with their works. A selection from the numerous eulogies of Washington, by various orators, would of itself form an interesting volume. The speeches and addresses of Clay, Webster, and Everett, have been published in separate volumes, and are, we think, models of their kind.

THIRD PROVINCE;

PHYSICONOMY.

In the province of Physiconomy, we would include those studies which relate more immediately to the material world; its forms and structure; its agencies and changes; its composition and varied relations; including those of animal and vegetable life. The name is derived from the Greek φυσις, nature: and νομος, law; signifying literally the Laws of Nature; using this term, as it is often used, to designate the world of matter, or material objects collectively considered. In this province we comprehend the departments of *Mathematics*, or the study of numbers and magnitudes; *Acrophysics*, or Natural Philosophy, relating chiefly to natural phenomena; *Idiophysics*, or Natural History, treating chiefly of natural productions; and *Androphysics*, or the Medical Sciences, relating chiefly to the human frame, that microcosm, or minor world, the last and highest material production of the great Creator. The reasons for arranging these departments in the above mentioned order, having already been stated, need not here be repeated. (See pp. 34 and 35.)

IX. DEPARTMENT:

MATHEMATICS.

The department of Mathematics, includes the study of numbers and magnitudes; and hence it is sometimes termed, the *science of quantity*. The name is from the Greek μανθανω, I learn: and was applied to it, because the ancients considered this department, in reference to its various uses, as the basis of all learning. As it finds its highest applications in the investigation of the laws of nature, we have here considered it as chiefly introductory to their study; and as belonging to the same province of human knowledge. As the science of quantity, it is applicable to all quantities which can be measured by a standard unit, and thus expressed by numbers or magnitudes. There are objects, such as feeling or thought, which may vary in intensity, but which we have not the means of measuring. We cannot say that we love one person exactly twice as much as another; or that one man is four times as wise as another; since love and wisdom are not mathematical quantities. But we can measure *time*, by seconds, days, or years; *space*, by inches, yards, or miles; and *motion*, by the space passed over in a given unit of time. Such quantities, therefore, may be expressed by numbers, and subjected to Mathematical calculations.

Mathematics, as a general science, is often subdivided into Pure, and Mixed. *Pure Mathematics*, relates to numbers, figures, or magnitudes abstractly, and without any necessary reference to material or tangible objects: but *Mixed Mathematics*, is the application of the former to natural objects; as matter, space, time, motion, and the like, which, though subject to mathematical relations, involve other principles, depending on the laws of nature. Thus, Mechanics, Astronomy, Navigation, Music, and other sciences, are sometimes included under the name of Mathematics: but we would here restrict the term to the Pure Mathematics, with some occasional applications; as being sufficiently extensive and important to constitute one department of human knowledge. It should not be forgotten that new mathematical principles and problems have led to new discoveries in nature, or inventions in the arts; and these, in their turn, have led to other new principles and problems in Mathematics.

The question may here arise, into how many branches this department should be divided. The branches of Arithmetic, Algebra, and Geometry, are generally recognized as distinct and elementary; while Trigonometry is sometimes connected with the latter, and sometimes regarded as a distinct branch. Considering, however, that Trigonometry is an application of Algebra to certain Geometrical figures, we have no hesitation in associating it with Conic Sections, in the branch of Analytic Geometry. The study of Descriptive Geometry, or the delineation of objects geometrically, as it involves no other principles than those of Elementary Geometry, and differs chiefly in the mode of applying those principles, we would include in the same branch, under the common name of Geometry. There remains only the science of Fluxions, as it was named by Newton, or the Differential and Integral Calculus, as it has been named by the French mathematicians, to complete the list of branches in this department.

The History of Mathematics, may, we think, be referred chiefly to that of its individual branches. The knowledge of the ancients, in this department, was evidently far inferior to that of the moderns. Although they reckoned by tens; a fact which is adduced, among others, as proving the common origin of the nations thus reckoning; yet they did not use, and probably were not acquainted with the decimal notation which has so greatly simplified our modern Arithmetic. In Elementary Geometry, and the Conic Sections deduced therefrom, the knowledge of the Greeks would bear a comparison with that of modern times ; but in these branches only, of the Pure Mathematics. Some of their most learned works were destroyed in the Alexandrian Library, or during the dark ages ; but others were preserved by the Arabians themselves, when a milder dynasty succeeded ; and the Greek works collected and translated into Arabic, by order of the Caliph Al Mamun, have supplied much of the information which we now possess, concerning ancient science. (p. 289.)

To the Arabians, we are indebted, for the introduction of the Decimal Notation, and for the science of Algebra ; which they appear to have transmitted rather than invented ; as we shall have occasion to show, in treating of the individual branches. Their mathematics, being introduced by the Moors into Spain, was zealously cultivated by Alphonso of Castile ; and from thence it was introduced into France, as early as A. D. 970, by Gerbert, who afterwards became Pope Sylvester II. It was disseminated in Italy, about A. D. 1228, by Camillus Leonard, a rich merchant of Pisa, who had travelled in the East; and at about the same time, John of Halifax, or Sacrobosco, of England, wrote a treatise on the Arithmetic of the Arabs. From that period to the present, the progress of mathematics has been continuous ; and the greatest nations of Europe have been competitors for the honor of its new discoveries and inventions.

The invention of Analytic Geometry, by Descartes, and of Coördinates, by Maclaurin, has greatly extended our means of investigating curves, and curved surfaces in general, as well as their included solids. The invention of Logarithms, by Napier, has simplified, in a wonderful degree, the higher numerical calculations, which before were extremely tedious. The invention of Descriptive Geometry, by Monge, has given us a complete method of representing and measuring geometrical magnitudes, and forms ; the applications of which are of great practical value. And especially, the invention of Fluxions, or the Calculus, almost simultaneously by Newton and Leibnitz, has opened the way to a new and wide range of mathematical investigation, quite beyond the reach of ancient science, and which has served, in skilful hands, to detect and explain various laws of nature that before seemed absurd or contradictory.

We proceed to speak more particularly of the individual branches of Mathematics; commencing with Arithmetic, taking next Algebra, Geometry, and Analytic Geometry, or Ancylometry, and concluding with the Calculus, or Rheometry.

CHAPTER I.

ARITHMETIC.

Arithmetic is that branch of Mathematics which treats of calculation by means of the Arabic numerals, or ordinary characters representing numbers. Its name is derived from the Greek αριθμος, a number; and it is regarded as a science, when we study its theory or principles; but as an art, when we apply it in practice. From its constant application to other sciences, and to the common pursuits of life, it is one of the most useful branches of knowledge, among those which are necessary to complete an elementary education. It is much to be regretted that in teaching its rules, attention is not more generally paid to the theory or reasons on which those rules are founded; both as rendering them more intelligible, and as serving to discipline the mind.

The invention of Arithmetic, is attributed by Josephus to the Hebrews; by Strabo, to the Phœnicians; and by others to the Egyptians, Chaldeans, or Indians. Its first principles, were evidently known, at a very early period, by the *Chaldeans and Egyptians*, from whom the Hebrews and Phœnicians doubtless received them. They were introduced into Greece, by Thales, and Pythagoras; both of whom travelled among the nations just named; doubtless acquiring, as well as communicating knowledge. Pythagoras either invented or borrowed the *Multiplication Table*, about 520 B. C.: and, in some books, it is still called by his name. Much of the Arithmetic of Pythagoras, and the other philosophers, related to imaginary mystical properties of numbers; such as the *Tetrachys*, or most perfect number, (36 or 40), to which they attributed wonderful virtues. The *Sieve of Eratosthenes*, was a contrivance for finding the series of Prime numbers, by successively cancelling all those which admit of exact division: and the properties of Square numbers, were the subject of many problems invented by Diophantus.

We have already remarked that although the ancients reckoned by tens, they did not use our modern Decimal notation. The Greeks used the first letters of their alphabet for the successive numbers as far as ten; but the next letter stood for 20, and the next for 30, thus proceeding as far as 100; after which the next letter stood for 200, and so on to 1000, which was represented by the first letter of the alphabet, with a dash beneath it. Three additional characters, however, were used in this scheme, as already explained. (p. 56.) They also used numerals, similar to the Roman, though not the same. The *Roman numerals* probably originated as follows. They expressed the numbers from one to five, by straight marks, which afterwards took the form of the letter I. Five was expressed by two straight marks, meeting in the shape of the letter V. Ten, being expressed by two V's, one of them inverted, would form the letter X. Fifty, being expressed by two straight marks in a new position, would form the letter L, which might also have been derived from the lower half of the letter C: but C and M were more probably abbreviations of *centum* and *mille*, the Latin words for 100 and 1000.

Early in the second century of our Era, Ptolemy introduced the *Sexagesimal notation;* which probably originated in India, where it is still used. From 1 to 59, the numbers were expressed by the Roman numerals; but 60 was represented by I with a dash on the right, (I′); twice 60 by (II′), and so on to 60 times 60, which was represented by I with two dashes, (I″); and so onward. Hence came our division of the hour and degree into 60 minutes, and of the minute into 60 seconds. The *Decimal notation*, already noticed, as introduced by the Arabians, is proved by Montucla, almost conclusively, to have been invented in India, before the Arabian conquests. The first European writer who is known to have employed this system, was Jordanus Nemorarius, A. D. 1230: but it was not applied to fractions till nearly 300 years thereafter. The rules of *False Position*, were also borrowed from the Arabians.

We shall treat further of Arithmetic, under the heads of, 1, Ground Rules; 2, Denominate Numbers; 3, Fractions; 4, Proportion; 5, Mercantile Rules; and 6, Powers and Progressions.

§ 1. The Five *Ground Rules* of Arithmetic, constituting the Arabic *Algorithm*, are Numeration, Addition, Subtraction, Multiplication, and Division. *Numeration*, is the art of writing or reading numbers, expressed by means of figures; whereas *Notation* rather signifies the kind of figures used, as the Roman, or Arabian. The nine digits and cypher, of the latter notation, express directly any number less than ten: but every *ten* is regarded as a distinct quantity, and expressed by a figure in the second place; that is, with another figure on the right of it, to make it stand in the tens' place, and to express the remaining units. Every ten of these tens, forms one hundred; which is written in the third place, with two other figures necessarily on the right of it, for the surplus tens and units. Thus, the great principle of Numeration, is, to regard every number as composed of units of different kinds; each higher unit being equal to ten of the next lower, throughout the scale. For example, the number 1841, is written as if it were the sum of the numbers, 1000, 800, 40, and 1.

Addition, is the putting together of two or more numbers, and finding of their sum. For this purpose, we write the numbers, one under another, so that all the right hand figures or units may be in the same column, or vertical line; after which, we add all the units together, and find how many tens they make, setting down the remainder for the odd units of the sun. We then *carry* the tens thus found, that is add them, to the column of tens; and find how many tens of tens, or hundreds this column contains, setting down the surplus tens as the odd tens of the sum. In like manner, we carry the hundreds to the third column, and so repeat the process till we come to the last column; the whole sum of which being written on the left, completes the total sum required.

Subtraction, is the taking of a smaller number, or *subtrahend*, from a larger number, or *minuend*, and finding what remains. To do this, we write the subtrahend underneath the minuend, units under units, and so on: then beginning with the units, we take each lower figure from the one above it, and write the difference below, to form the remainder sought. If the upper figure happen to be the smallest, we add *ten* to it, and subtract as before; and to compensate for this, we add *one* to the next lower figure, before subtracting it; which increases the lower line as much as the upper, and thus preserves their difference unchanged.

Multiplication, is the repeating of a given number, called the *multiplicand*, as many times as are denoted by another given number, or *multiplier:* the two numbers thus employed being called *factors;* and the sum obtained being the *product*. The operation might be performed, by, writing down the multiplicand as many times as the multiplier denotes, and adding the whole together: but this would be tedious. Hence, we write the multiplicand only once, and the multiplier underneath; then multiply the upper line by the unit figure of the multiplier; carrying as in addition, and writing the result. If the multiplier have a second figure, we multiply the upper line by this also, setting the first figure of its product, which expresses *tens*, under the tens of the first product; and so proceeding to the left. If the multiplier contain hundreds, the first figure of their product must come under the place of hundreds; and so to the end. Then, adding all these partial products together, the sum will be the total product required.

Division, is the process of finding how many times one number, called the *divisor*, may be contained in, or taken from, another, called the *dividend;* and also whether a surplus number remains. This last, if there be any, is called the *remainder:* and the number which expresses how many times the divisor is contained in the dividend, is termed the *quotient*. To find it, we take as many figures on the left of the dividend, as are sufficient to contain the divisor; and the number of times they contain it, will be the left hand figure of the quotient. We multiply the whole divisor by this figure, and subtract the product from that part of the dividend used. To the right of the remainder, if any, we bring down the next figure of the dividend, and divide again to obtain the next figure of the quotient; or if the remainder thus increased be too small, we place a cypher in the quotient, and bring down another figure to the remainder, with which we obtain another quotient figure, as in the first instance. When all the figures of the dividend are brought down, and all those of the quotient found, the last subtraction will give the final remainder. The reasons for this rule, we have no room here to present.

§ 2. By *Denominate Numbers*, called also Compound, or Complex Numbers, we mean those that refer to certain kinds of quantity, having different denominations; as pounds, shillings, and pence; miles, rods, feet, and inches; days, hours, minutes, and seconds; and other like series. The different tables, expressing the *ratios* of these denominations, we have no room to insert. Denominate numbers of the same kind, can be added or subtracted in the same manner as simple numbers; except in the item of carrying from a lower to a higher denomination. To *add* them, we commence with those of the lowest denomination, and find how many units these will make of the next higher; carrying therefor; and setting down the excess or surplus as a part of the sum; thus proceeding through all the denominations, to the highest, in which we set down the total sum. To *subtract* denominate numbers, we proceed as in simple numbers: only, when the upper number is the smallest, we add to it as many units as are required of this denomination to make one of the next higher; in return for which, we add *one* to the lower number of the next denomination, before subtracting it from that above.

Multiplication of a Denominate number by a simple one, is performed as in simple numbers; only carrying by the proper *ratios* in passing from one denomination to the next higher. We cannot properly multiply one denominate number, by another, without considering one of the two abstractly, as composed of certain units and fractional parts; as is sometimes done in the Rule of Three. *Division* of Denominate numbers, by a simple number, is performed as in simple division: only, when we have a remainder of a higher denomination, we reduce it to the next lower, by multiplying by the proper *ratio*, and to the product we add the number of the same denomination in the dividend, before dividing, to find the number of that denomination in the quotient.

§ 3. *Fractions*, are broken numbers, or parts of entire numbers; the common kinds of which are Vulgar, and Decimal. A *Vulgar Fraction*, is expressed by two numbers, written one above the other, with a line drawn between them. The lower number, called the *denominator*, shows into how many equal parts a unit is supposed to be divided; and the upper number, called the *numerator*, shows how many of these parts the fraction expresses. By increasing the denominator, we diminish the value of the fraction; because while the number of parts remain the same, the value of each of these parts is diminished, as more of them are required to make one unit. To *add*, or *subtract*, vulgar fractions, we must first reduce them to a *common denominator;* in order that they may express like parts of unity. This may be done by multiplying both the numerator and denominator of each fraction by the product of all the other denominators, as the value of the fractions will not be changed thereby. We have then only to add or subtract the numerators, and write the sum or difference over the common denominator, for the result required.

To *multiply*, or *divide*, a vulgar fraction by a whole number, we have only to multiply or divide the numerator; preserving the denominator unchanged. Or instead of dividing the numerator, we may multiply the denominator, to perform the division. To multiply two fractions together, we have only to write the product of the numerators over that of the denominators: but to divide one fraction by another, we invert the terms of the divisor, that is, make its numerator and denominator change places, and then multiply the fractions together. A *mixed number*, consisting of a whole number and a fraction, is reduced to a fractional form, by multiplying the whole number by the denominator, adding the product to the numerator, and writing this sum over the same denominator; forming what is called an *improper fraction.*

Decimal Fractions, are those in which the denominator is always one-tenth, one-hundredth, one-thousandth, or other decimal part of a unit; so that by simply writing the numerator, with a point on the left side of it, called the *decimal point*, the denominator need not be written at all. Thus, $\frac{5}{10}$ is written, .5; and $\frac{54}{100}$ is the same as .54; the denominator always consisting of the figure 1, with as many cyphers on its right as there are *decimal places*, that is, figures on the right of the decimal point. To convert a vulgar fraction into a decimal, we annex cyphers to the right of the numerator, and then divide it by the denominator; observing that the quotient, or decimal sought, must have as many figures as we annexed cyphers; and supplying any deficiency in the quotient by cyphers on its left. Decimals are *added*, and *subtracted*, in the same manner as whole numbers; placing them with the decimal points always one under the other, and beginning on the right; since decimals and whole numbers, together, form one continued series in tenfold proportion. Decimals are also *multiplied*, and *divided*, in the same way as whole numbers; only, the product must contain as many decimal places as there are in both the factors; and the quotient, as many as there are in the dividend more than in the divisor. The deficiency, if there be any, must, in either case, be supplied by cyphers on the left.

§ 4. *Proportion*, signifies a certain definite relation of several quantities. Four numbers are said to be in *Arithmetical proportion*, when the first is *as much* greater or less than the second, as the third is greater or less than the fourth: as in the example, 2 ·· 4 : : 18 ·· 20. But four numbers are in *Geometrical proportion*, when the first is *as many times* greater or less than the second, as the third is greater or less than the fourth: as in the example, 20 : 4 : : 500 : 100. The first term divided by the second is called the *ratio* of the *antecedents*, and the third term divided by the fourth, is the ratio of the *consequents:* and these two ratios are equal. It also follows that the product of the two middle, or *mean terms*, is equal to the product of the two *extremes:* and the product of the means, divided by one extreme, gives the other extreme for a quotient.

The *Rule of Three*, is the process in which we have three numbers given, and seek to find a fourth, which shall complete the geometrical proportion. Of the three given numbers, one will necessarily be of the same kind as the fourth, or answer sought; and this may occupy either the second or third place. If the answer sought, ought to be greater than this, then the greater of the other two terms should be placed last of these two; both being reduced to the same denomination: but if the answer ought to be less than that term which is of the same kind with it, then the lesser of the other two terms should be placed last of those two, and the greater of them will be the first. The question being thus stated, multiply the second and third terms together, and divide their product by the first; and the quotient will be the fourth term, or answer sought. A *Compound Proportion*, including the solution of problems by what is called the Double Rule of Three, is merely a connection of two or more simple proportions; by means of which it may always be resolved; without requiring any special rules.

§.5. Of the strictly *Mercantile Rules* of Arithmetic, most of which depend upon the principles of proportion, we have only room to speak very briefly. *Tare and Trett*, is a rule for making allowances in selling goods by weight. *Tare*, is an allowance for the weight of the box, bag, or other recipient; and *trett*, or *draft*, is a per centage deduction for refuse, waste, or loss. These being taken from the gross weight, leave the *net weight* for the remainder. *Interest*, is an allowance made for the use of money; and is generally reckoned at a certain *rate per cent., per annum:* that is a certain number of dollars paid for the use of one hundred dollars for one year. *Insurance*, paid for risks; *Brokerage* or Commissions, paid for exchanges or sales; and *Discount*, allowed for the payment of money before it becomes due; are also usually reckoned at a certain rate per cent. *Loss and Gain*, is the rule by which merchants discover their total profit or loss, in buying or selling certain quantities at fixed rates: and *Fellowship* relates to the division of profit or loss among partners. *Alligation*, is the rule for finding the price of mixtures, or for making mixtures of a given value.

§ 6. The *Powers*, of any number, are the successive products of that number by itself, and of this product by the same number again: the *exponent* of the power denoting how many times the same number is taken as a factor. One multiplication produces the *square*, or second power, of which *two* is the exponent; and a second multiplication produces the *cube*, or third power, the exponent of which is *three*. Thus 25 is the square, and 125 is the cube, of the number 5; and its fourth power, or *biquadrate*, is 725. The *Root*, of any number, is another number, which, multiplied by itself a certain number of times, will produce the given number. Thus 5 is the square root of 25; and it is the cube root of 125. *Involution* is the process of finding powers; and the name *Evolution* is given to that of finding roots.

A *Progression*, is a series of numbers in continued proportion. In an *Arithmetical series* or progression, each term is found by adding or subtracting the *common difference* to or from the preceding; according as the series is increasing or decreasing. In either case, the sum of the series is equal to the sum of the two extreme terms multiplied by half the number of terms. A series is in *Geometrical progression*, when each term is either the product or the quotient of the preceding term by a *common ratio*. In such a series, any four consecutive terms form a geometrical proportion. The *Rules of Position*, for which those of Algebra are a far preferable substitute, we have no room to describe.

CHAPTER II.

ALGEBRA.

ALGEBRA is that branch of Mathematics in which the relations of quantities are expressed, and problems resolved, by means of letters and other symbols. The name is derived from the Arabic phrase, *Al gebr u al mocabela*, signifying the reduction of equations: and from the generality of its results, it has also been called *Universal Arithmetic*. It presupposes a knowledge of Arithmetic, or at least of the elementary rules, on the general principles of which it also depends; but in representing unknown or variable quantities by *letters*, and expressing their relations by means of other *symbols*, it reaches a wide range of useful and curious problems, and theorems, which common Arithmetic could never grasp.

The first germs of Algebra are found in the writings of Diophantus of Alexandria; who flourished A. D. 350, and is the reputed inventor of the *indeterminate analysis*. His works, however, are merely a collection of difficult questions concerning squares and cubes, and the general properties of numbers. Here ends the history of Algebra among the ancients: and, accordingly, its invention is ascribed by some writers to the Hindoos; and by others to the Arabians; to whom we are indebted, as has already been mentioned, for its introduction into Europe. The earliest mentioned Hindoo writer on Algebra, is said to have been the astronomer, Aryabhatta, probably as early as the fifth century of our era. Some of the Arabians admit that they received their Algebra from India; but others attribute its invention to their countryman, Mahomed Ben Musa, about A. D. 800; and, in either case, it was doubtless improved by their mathematical knowledge derived from Greek authors.

The first printed treatise on Algebra, entitled *Summa de Arithmetica*, was published in Italy, in 1494, by Lucas Paccioli de Borgo; but it only extended to quadratic equations. The first resolution of cubic equations, is claimed by Tartaglia, (or Tartalea), about 1535; and that of biquadratic equations is ascribed to Ferrari, by Cardan of Pavia, in his book *De Arte Magna*, published in 1545. Cardan used letters to represent unknown quantities: but Vieta of France, who died in 1603, first applied them to known quantities; and thus generalized the solutions. Vieta also improved the modes of resolving equations; particularly by approximation. Harriot, of England, who died in 1621, first discovered that every algebraic equation is composed of as many factors of the first degree, as are indicated by the degree of the equation. *Descartes* first introduced the use of exponents; and explained the nature of the negative roots of an equation: and he also made the application of indeterminate coefficients, to resolve equations into their several factors. *Newton* enriched Algebra, not only by farther discoveries concerning equations, but by the invention of the binomial theorem, for problems of involution and evolution. The later discoveries of Maclaurin, Clairaut, Euler, Lagrange, and others, we have no room to describe. The invention of *Logarithms*, by Napier, of Scotland, in 1614, with the improvement of Professor Briggs, has particularly facilitated the numerical operations of Algebra, to which science they belong: and the Arithmetical Triangle of Pascal, who died in 1662, by exhibiting the properties of figurate numbers, originated the *Calculus of Probabilities;* a distinct and interesting application of Algebra.

We proceed to treat of Algebra under the heads of 1. Preliminary Rules; 2. Simple Equations; 3. Quadratic Equations; 4. Powers and Roots in general; 5. Equations in general; and 6. Series and Logarithms.

§ 1. The *Preliminary Rules* of Algebra, relate to its peculiar *symbols*, and their simple applications. In this science, quantities, or rather numbers, are expressed by *letters:* and it is the general practice to use the first letters of the alphabet for known quantities, and the last for unknown. The sign of addition, ($+$), is read *plus;* and shows that the quantity placed after it, is to be added to the preceding. The sign of subtraction, ($-$), is read *minus;* and is placed before quantities that are subtractive, or to be subtracted. The sign of multiplication, ($\times$), called St. Andrew's Cross, is read *into*, and placed between quantities that are factors: or they may be written each in a parenthesis; or if letters, with simply a point, or without any sign, between them. The sign of division, ($\div$), may be read *divided by*, being placed after the dividend, and before the divisor: but division is more generally indicated by writing these quantities as a fraction; the divisor becoming the denominator; and the value of the fraction being the quotient.

The *power* of a quantity, in Algebra, is expressed by writing its *exponent* above the quantity, on the right. Thus a^2 denotes the square of a; and a^3, its third power, instead of aaa. If a denote 5, a^3 will denote 125. The *co-efficient* of a quantity, is properly the number written as its first factor: thus $3a$ denotes three times a, and three is the co-efficient. If a denote 5, then $3a$ will be 15; and $3a^3$ will be 3×125, or 375. *Like quantities*, are those which consist of the same letters, raised to the same powers; as $6\,a^2 b$, and $12\,a^2 b$; which are *added* or *subtracted*, simply by adding or subtracting their co-efficients, and appending the literal part. *Unlike quantities*, do not admit of this reduction; but must all be written with their proper signs. To subtract any quantity, we must change its sign, and append it to the subtrahend; or if no sign be written, plus is understood. A *term*, in Algebra, is a simple expression, not separated into parts by the signs, plus, or minus. A single term is called a *monomial;* but a quantity having two terms is called a *binomial;* and one having more than two terms, a *polynomial*.

In Algebraic *multiplication*, the product of two terms must contain all the factors of them both; and its sign will be plus, if the terms have like signs, but minus, if their signs are unlike, that is, one positive, and the other negative. Thus the product of $6\,a^3 b$, by $7\,a\,b^2 c$, is $42\,a^4 b^3 c$. The product of two polynomials, is the sum of all the products of each term of the multiplicand by each term of the multiplier. Algebraic *division* of monomials, is the reverse of multiplication; and consists in cancelling from the dividend all the factors which it has in common with the divisor; the remaining factors being the quotient. Division of polynomials is performed in much the same manner as arithmetical division; requiring first that all the terms both of the dividend and divisor should be arranged according to the powers of some one letter; after which the first term of the quotient is found by dividing the first term of the dividend by the first of the divisor. Of algebraic fractions, which are similar to arithmetical, we have no room to speak farther.

§ 2. An *Equation*, is an expression denoting the equality of two quantities: and a *Simple Equation*, is one in which no unknown quantity is multiplied either by itself or by any other unknown quantity. The sign of equality, (=), is read, *equal to*, and is placed between the two equal qualities which are the first and second *members* of the equation. Common algebraic problems are most frequently solved by means of equations; or by proportions, from which equations are easily obtained. To form the equation, we usually express the unknown quantity, if there be but one, by the letter x; and with this we form an expression which, by the conditions, is equal to some other expression or formula; after which it only remains to find the value of x from the equation thus formed. Thus, to find a certain number, twice which, being added to 76, and the sum divided by 4, the quotient will be equal to 10 times the same number, we write the equation $\frac{2x+76}{4}=10x$; as the first operation.

If we multiply each member of the above equation by 4, it will form another equation, free from denominators, and without changing the value of x; viz. $2x+76=40x$. The next step, is, to bring all the terms containing the unknown quantity to stand by themselves, in one member, usually the first member of the equation. In the present example, to *transpose* the term $2x$, to the second member of the equation, we cancel it, where it stands, which is really subtracting it from the first member: and hence we must also subtract it from the second member; and write $76=40x-2x$; or by reduction, $76=38x$. If, now, we divide both sides of the equation by 38, the co-efficient of the unknown quantity, we shall have $2=x$; or $x=2$. When the problem involves two distinct unknown quantities, say x and y, there must be two distinct equations; from one of which we find the value of x, in terms containing y; and then *substitute* this value of x, wherever x occurs, in the other equation: which will then contain only one unknown quantity, y.

§ 3. *Quadratic Equations*, are those which contain the square or second power of the unknown quantity; but no higher power. To resolve them, we first transpose, if necessary, so as to bring all the terms containing x^2 to stand first in order; those containing x to stand next; and all the known terms, that is, those which do not contain x, form the other member of the equation. We then divide both members by the co-efficient of x^2, which reduces the equation to the regular form, $x^2=a$, for *pure* quadratics, and $x^2+ax=b$, for those which are *affected*, or complex: a and b here simply denoting any known quantities. A pure quadratic, is then resolved, simply by extracting the square root of both of its members. Thus, from the equation $10 = 108 - 2x^2$, we obtain $2x^2 = 108 - 10$; or $2x^2 = 98$; or $x^2 = 49$; or $x = 7$. In this case we may have $x = 7$, or $x = -7$; since a negative quantity multiplied by itself produces a positive square. As the square root of any quantity is denoted by the *radical sign*, ($\sqrt{\ }$), we might have written above, $x = \sqrt{49} = \pm 7$.

The square root of a monomial, is also a monomial: but if we multiply $x + a$ by $x + a$, we shall have $(x + a)^2 = x^2 + 2\,ax + a^2$; that is, the *square of a binomial*, is made up of the square of the first term, plus *twice* the product of the two terms, plus the square of the last term. This suggests the rule for extracting the square root of a polynomial; which we have no room here to present. Hence, to resolve a *complex quadratic equation*, when reduced to the regular form, $x^2 + ax = b$; we must consider ax as *twice* the product of the two terms of a binomial root; and x being one of them, $\frac{1}{2}\,a$ will necessarily be the other. We must therefore add the square of $\frac{1}{2}\,a$ to each member of the equation; making $x^2 + ax + \frac{1}{4}\,a^2 = b + \frac{1}{4}\,a^2$; and the first member will then become a trinomial and perfect square; while the second member will contain only known quantities. Then, extracting the square root of each member, we have $x + \frac{1}{2}\,a = \pm \sqrt{b + \frac{1}{4}\,a^2}$; from which, as a simple equation, the value of x may readily be found. For example, if we have $x^2 + 6\,x = 27$, then is $x^2 + 6\,x + 9 = 27 + 9 = 36$; and $x + 3 = \pm 6$, or $x = \pm 6 - 3 = 3$, or -9.

§ 4. The theory of *Powers* and *Roots* in general, comes next in order, as a preparation for the more general study of equations. If we form the successive powers of the binomial $a + b$, we shall have

$$(a + b)^2 = a^2 + 2\,a\,b + b^2.$$
$$(a + b)^3 = a^3 + 3\,a^2 b + 3\,a\,b^2 + b^3.$$
$$(a + b)^4 = a^4 + 4\,a^3 b + 6\,a^2 b^2 + 4\,a\,b^3 + b^4.$$

In the formation of these powers, we observe certain remarkable laws, which have been generalized by Newton, in the *binomial theorem*. We see that the number of terms in the power, is one greater than its exponent. The exponents of the leading factor, a, go on diminishing by unity from term to term; while those of the succeeding factor, b, go on increasing, according to the same law. And to form the coefficient of any term, we multiply the co-efficient of the preceding term by the first exponent in that term, and divide the product by the number denoting the place of that term, counting from the first.

By these same rules, we may develope the powers of any other binomial. Thus, to develope $(2\,x + y)^3$, we write $2\,x$ instead of a, and y instead of b; and the result becomes, $(2\,x)^3 + 3\,(2\,x)^2\,y + 3\,(2\,x)\,y^2 + y^3$; or by reduction we have $(2\,x + y)^3 = 8\,x^3 + 12\,x^2 y + 6\,x\,y^2 + y^3$. Roots, in general, are denoted by the radical sign, ($\sqrt{\ }$), with the *index* of the root written above and on the left; except the square root, whose index is understood, but not written. As we multiply the exponent, in raising to a power, so we may divide the exponent, to extract the root; thus forming a fractional exponent.

For example, $\sqrt[3]{64} = (64)^{\frac{1}{3}} = 4$; since $4 \times 4 \times 4 = 64$. We have only room to add that by means of fractional exponents, the binomial theorem serves also to develope or extract roots in general, in the form of a series; which, in these cases, is generally *interminous*, or endless.

§ 5. The general *Theory of Equations*, depends on the principle that every equation, having all the terms transposed to the first member, and arranged according to the powers of the unknown quantity x, may be regarded as the continued product of as many binomial factors, $x - a$, $x - b$, $x - c$, &c., as the degree of the equation, that is, the highest exponent of x, denotes. Thus, if we have the equation $x^2 + 2x = 15$, or $x^2 + 2x - 15 = 0$, it may be written thus, $(x + 5)(x - 3) = 0$; and this equation will be satisfied, if we make $x = 3$; since the factor $x - 3$ then becomes zero, and reduces the whole member to 0 also: or if we make $x = -5$, the other factor will become equal to zero, and the equation will be satisfied; and hence 3, and -5, are called the *roots of the equation*. Particular rules have been discovered for resolving equations of the third and fourth degrees; but for those of higher degrees no general rules have yet been discovered. *Numerical equations*, or those which contain no other letters but the unknown quantity, may generally be resolved by approximation: simple and quadratic equations being those of far the most frequent occurrence.

§ 6. We have alluded to Arithmetical and Geometrical *Series*, or Progressions, under the head of Arithmetic; and have given examples of other series, in the application of the binomial theorem. We have only room left here to speak of *Logarithms;* which are a series of numbers in arithmetical progression, corresponding to the natural numbers in geometrical progression. Their nature will best be understood by examining the following scale, in which the logarithms are placed under the natural numbers to which they correspond.

1;	10;	100;	1000;	10,000;	100,000;	1,000,000.
0;	1;	2;	3;	4;	5;	6.

Thus, in the common system, 2 is the logarithm of 100; and the logarithm of any number between 100 and 1000, is some decimal between 2·00000 and 3·0000. It will be seen that *adding* the logarithms, corresponds to *multiplying* the numbers; and subtracting the logarithms, corresponds to the division of one of the numbers by the other. For example, subtracting 2 from 5, the difference is 3, the logarithm of 1000; which is the quotient of 100,000 divided by 100. Moreover, to raise a number to any power, we have only to multiply its logarithm by the exponent of that power, and it will give the logarithm of the power sought; from which the power itself may be found by means of a table of logarithms. In like manner, the extraction of any root is performed simply by dividing the logarithm of the number, by the index of the root, and the quotient will be the logarithm of the root required.

CHAPTER III.

GEOMETRY.

Geometry, is that branch of Mathematics which treats of the measurement of space, and the properties of lines, surfaces, and solids. The name is derived from the Greek, γη, the earth, or land, and μετρον, a measure: and this science was thus designated from its early application to the measurement of land. Under this branch, we would also include the modern *Descriptive Geometry;* for reasons already given in the introduction to the present department. The science of Geometry, is one of the most beautiful, as it is also one of the most useful, among the exact sciences; and, from its frequent applications, in all the arts of construction, it is a branch which we think should be studied by every mechanic, if not generally introduced into our common schools.

The origin of Geometry, is ascribed by some writers to the Hindoos: but by others, as Herodotus, to the Egyptians, who employed it in retracing their landmarks, after each subsidence of the Nile. It was introduced into Greece by *Thales*, and his pupil, *Pythagoras*, both of whom travelled in Egypt. Thales discovered that all angles inscribed in a semi-circle are right angles; and Pythagoras, besides noticing the five regular solids, discovered that the square on the hypothenuse of a right angled triangle is equal to the sum of those on the two sides. Hippocrates of Chios, by the quadrature of his famous *lunulæ*, was the first to discover the exact area of a curvilinear figure; 450 B. C. Eudoxus, the friend of Plato, found the measure of the pyramid and cone; and *Archimedes* of Syracuse, that of the sphere and its circumscribed cylinder, which were sculptured on his tomb. This involved the quadrature of the circle, towards which Archimedes gave the first approximation. The two famous problems, in the Platonic School, of the trisection of an angle, and the duplication of the cube, led to the invention of geometrical loci: and the *spiral* of Conon, the *quadratrix* of Dinostratus, the *conchoid* of Nicomedes, and the *cissoid* of Diocles, are curves having reference to these problems.

Among the best ancient works on Geometry, were the *Mathematical Collections* of Pappus; and Euclid's *Elements;* which were first translated from the Arabic into Latin, by Adhelard, an English monk of the 12th century. The Arabians seem to have made no advances in Geometry; though Mahomet of Bagdad wrote an original work on Mensuration. Gerbert, already mentioned in the introduction to this department, also wrote a treatise on Mensuration; and the first printed treatise on Algebra, by Paccioli, already referred to, related in part to Geometry. Van Ceulen of Cologne, who died in 1610, calculated the ratio of the circumference to the diameter of a circle as far as to 36 places of figures: and Albert Girard, another Fleming, first found the area of a spherical triangle. Descartes first noticed the *logarithmic spiral;* and Galileo, the *cycloid;* which was afterwards more fully investigated by Huyghens.

In more recent times, numerous discoveries and improvements have been made in Geometry, by the application of algebraic formulas to geometrical figures; the study of which belongs to the succeeding branches of Mathematics. We have only room to add that the sub-branch of Descriptive Geometry, was chiefly invented by Gaspar Monge; who published his treatise on this subject, about the year 1794. Ptolemy drew maps according to the stereographic projection; but the other spherical projections are of later origin; and the globular was invented by De La Hire. The subject of Perspective, is here deferred, until we come to the branch of Painting, among the Fine Arts; and Surveying, is reserved for Civil Engineering, or Viatecture.

Elementary Geometry is sometimes divided into *Longimetry*, or the measure of lengths, and the properties of lines; *Planimetry*, relating to surfaces; and *Stereometry*, relating to solids. We shall here treat of it under the heads of 1. Preliminary Elements; 2. Plane Rectilinear Figures; 3. The Circle and its Measure; 4. Solid Angles and Polyedrons; and 5. The Three Round Bodies. To this division, Descriptive Geometry will be regarded as an appendix.

§ 1. The first *Elements of Geometry*, are the definitions of magnitudes. A *point*, has no magnitude, but serves to designate a position in space. A *line*, has length, but no breadth or thickness; and it may be considered as formed by a series of points, or generated by the *flowing*, that is the motion, of a point. A *surface*, has length, and breadth, but no depth or thickness; and it may be generated by the motion of a line. A *solid*, has length, breadth, and thickness; which are called the three dimensions of extension. A *straight line*, is one which follows or measures the shortest distance between any two of its points; or which lies in the same direction throughout: but a *curved line*, is one which continually changes its direction. An *angle*, is the inclination of one line to another; and is measured by the divergence at their point of meeting, which is called the *vertex* of the angle. In naming an angle by means of three letters, the one placed at the vertex is always named in the middle place; as *ABE*, Plate VII. Fig. 1. When the adjacent angles, formed by the meeting of two straight lines, are equal, they are called *right angles*, as ABD, Fig. 1; and each line is said to be *perpendicular* to the other. *Oblique angles*, are either *obtuse*, that is greater, or *acute*, that is less, than a right angle. Lines which are not inclined to each other, but have the same direction, are said to be *parallel;* as *AD* and BC, in Fig. 3.

A *plane*, is a surface, with which a straight line, applied to it in any direction, will entirely coincide. A *plane figure*, is a plane limited on all sides by lines; which, if straight, enclose a rectilinear figure, or *polygon*. A polygon of three sides, is called a *triangle*, as Fig. 2; one of four sides, a *quadrilateral*, or tetragon; one of five sides, a *pentagon;* and so on. A right angled triangle, has one right angle; the side opposite to which is called the *hypothenuse;* as BC, in the triangle BDC, Fig. 2. An *equilateral* triangle has its three sides equal; an *isosceles* triangle has only two of them equal: and a *scalene* triangle has no two sides equal. A *square*, has four equal sides, and four right angles, as ABCD, Fig. 3; and a *rectangle*, has four right angles, but two of the sides longer than the other two, as ABDC, Fig. 9. A *rhombus*, has its four sides equal, but its angles oblique: a *rhomboid*, or parallelogram, has its opposite sides equal, but its angles oblique, as ABEF, Fig. 3; and a *trapezoid*, has only two of its four sides parallel, as ABCF, Fig. 3. A *diagonal*, is a line joining the vertices of two angles not adjacent to each other.

A *circle*, is a plane surface, terminated by a curved line, called its *circumference*, all the points of which are equidistant from a point within, called the *centre*. Fig 4. A straight line passing through the centre, and terminated by the circumference on both sides, is called a *diameter*, (AB); and a straight line from the centre to the circumference, is called a *radius*. (OB). An *arc*, is any portion of the circumference, (AC); and the *chord* of an arc is a straight line joining its extremities. A *segment*, is the surface between an arc and its chord; and a *sector* is the surface between two radii. (BOB′). A *tangent* to a circle, is a straight line which merely touches it, (AT); and a *secant*, is one which cuts the circle, as a chord prolonged. An angle formed by two radii, is measured by the intercepted arc; a right angle being divided into ninety degrees. (90°.) Angles of a given magnitude, are usually constructed by means of a *scale of chords*, AF, Fig. 12; the chord of 60°, or distance A, 60, being used as the radius.

§ 2. Of *Plane Rectilinear Figures*, we have only room to give some of the more important measures. In every triangle, the greater side is opposite to the greater angle: and either side is always less than the sum of the other two. In every triangle, the sum of the three angles is equal to two right angles, or 180°. When two triangles have the angles of the one equal to the corresponding angles of the other, each to each, they are said to be *similar;* and the *homologous* or corresponding sides are proportional. The *measure of a triangle*, is the product of its base by half its altitude; this latter being measured on a line perpendicular to the base. The square on the hypothenuse, of a right angled triangle, is equal to the sum of the squares on the other two sides. The measure of a *square*, is the square of one of its sides; and the measure of a *rectangle*, is the product of two of its contiguous sides, one being considered as the base, and the other as the altitude. The measure of a *rhombus*, as well as that of a parallelogram, is the product of its base by its altitude; this latter being measured on a line perpendicular to the base. Any *polygon*, may be measured, by subdividing it into triangles, and finding the sum of their *areas*, or measures, separately taken. In all these measurements, the *unit of surface*, is a square, each side of which is the adopted *unit of length;* as a square foot, each side of which is one foot in length.

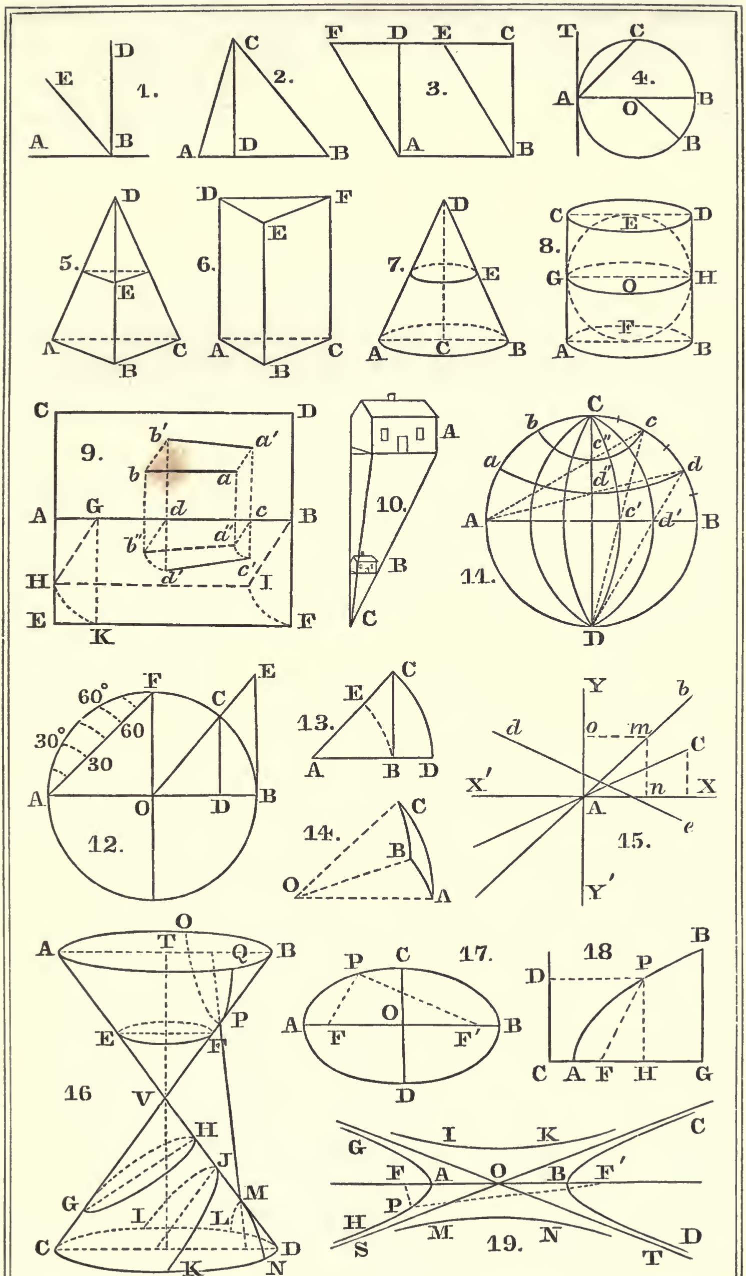
§ 3. We come next to the *Properties of the Circle*. In the same circle, or in equal circles, if we take equal arcs, their chords will also be equal, and at equal distances from the centre; that is, equal chords *subtend* equal arcs. The radius which is perpendicular to a chord, bisects both the chord, and the arc which it subtends. Every tangent is perpendicular to the radius drawn to its point of contact, that is, the point where it touches the circle. Arcs of circles are used to measure angles; the vertex of the angle being at the centre of the circle. An angle is said to be *inscribed* in a circle, when it is formed by two chords meeting on the circumference. A polygon is said to be thus inscribed, when all its vertices lie in the circumference: and it is said to be *circumscribed* about the circle, when all its sides are tangent to the circumference. The ratio of the diameter of a circle to its circumference, is nearly as 7 to 22; more nearly as 113 to 355; and still more nearly as 1 to 3·141596. The measure of a circle, is the product of the circumference by half the radius; or of half the circumference by half the diameter.

§ 4. The study of *Solid Angles, and Polyedrons*, requires some preliminary explanations. When a given straight line meets a plane, and is perpendicular to two other straight lines lying in the plane, and meeting the former at its *foot*, then the given line is perpendicular to all other lines in the plane, and to the plane itself. A line is parallel to a plane, and two planes are parallel to each other, when they do not meet, however far extended or produced. Two planes are perpendicular to each other, when either one of them contains any line which is perpendicular to the other. The angle formed by two planes, is measured by that of two lines, one in each plane, and both perpendicular to the line of intersection of the planes, and meeting it at the same point. A *solid angle*, is one formed by three or more planes, all meeting at the same point; which is the vertex both of the solid angle, and of the *plane angles* that enclose it; as the angle at D, or those at A, B, and C. (Pl. VII., Fig. 5.)

A *Polyedron*, is a solid, bounded on all sides with planes, called its *faces*, the terminating lines of which constitute its *edges*. A *cube* has six equal squares for its six faces. A *pyramid*, Fig. 5, is a solid enclosed by several triangular planes, proceeding from a common vertex, to the sides of a polygon which forms the base. A *prism*, Fig. 6, is a polyedron, the ends of which are similar polygons, and the sides are parallelograms. The measure of a prism is the product of its base by its altitude; which is the perpendicular distance between its two bases. The measure of a pyramid is the product of its base by one-third of its altitude, or perpendicular height. The *unit of solidity*, in these measurements, is a cube, each of whose edges is equal to the unit of length, and each of its faces equal to the unit of surface.

§ 5. The *Three Round Bodies*, technically so called, are the cone, cylinder, and sphere. A *cone*, Pl. VII., Fig. 7, is a solid generated by a right angled triangle, (ACD), revolving around one of its legs, or shorter sides, (DC), which remains stationary as an axis. A *cylinder*, Fig. 8, is a solid generated by the like revolution of a rectangle, about either one of its sides: and a *sphere*, is a solid generated by the revolution of a semicircle, around one of its diameters, which remains stationary as an axis. All possible sections of a sphere, by a plane, are circles; and planes cutting a cone, or cylinder, perpendicular to its axis, produce also circular sections. A *zone*, of

PLATE VII. MATHEMATICS.



Engraved by R. S. Gilbert, Phila.

a sphere, is a part of its surface, cut off by a plane, or intercepted between two parallel planes; and the intercepted solid is called a *spherical segment.* A *spherical triangle*, is a portion of the surface of a sphere, bounded by three arcs of *great circles*, that is, circles whose planes pass through the centre.

The *convex surface* of a cylinder, is equal to the circumference of its base, multiplied by its altitude: that of a cone, is equal to the circumference of its base, multiplied by its *slant height*, or distance from the vertex to any point of the circumference just named: and the surface of a sphere, is equal to the product of its diameter by the circumference of a great circle, that is, of the sphere itself. The measure of the *solidity* of a cylinder, is the product of its base by its altitude; that of a cone, is the product of its base by one-third of its altitude; and that of the sphere is the product of its surface by one-third of its radius.

§ 6. *Descriptive Geometry*, relates to the representation of geometrical figures on planes, and the construction of graphical problems thereby. It includes, therefore, the principles of perspective, and Spherical Projections. If we suppose the eye to be placed at a very great height, and looking vertically down upon an object situated above a horizontal plane, then the object will hide a part of the plane, of the same shape or outline, as that which the object itself presents to the eye. This representation of the object on the plane, is called its *horizontal projection;* and the plane itself is called the horizontal plane of projection. In like manner, if we suppose the eye to be placed in front of an object, and a vertical plane behind it, we may have a *vertical projection*, of the object, on the vertical plane of projection. When these two planes of projection are both used, they intersect each other in a line called the *ground line:* and if we suppose one of them, with any projections made upon it, to be revolved about the ground line as an axis, till it coincides with the other plane, we shall then have both the projections of any object, on one and the same plane; as that of the paper or drawing board. Plate VII., Fig. 9, represents the horizontal plane *GHIB*, as revolved about the ground line *AB*, until it coincides with the vertical plane ACDB, prolonged downwards to EF.

The projection of any *point*, is another point, directly above or below it, or else directly before or behind it; and is found by drawing a perpendicular from the given point to one or the other plane of projection. The projection of a *line*, is another line, lying in one or the other plane of projection; and is found by joining the projections of two of its points on that plane. The position of any plane, in space, is known, if we have its intersections with the two planes of projection; which intersections are called its *traces.* If a given plane be revolved about one of its traces as an axis, until it coincides with the plane of projection in which that trace lies, each point of the given plane will revolve in a circular arc, and take the same relative position in the given plane, after the revolution, as it had before. It is by an ingenious application of these and similar principles, that lines, surfaces and solids may be delineated on a single plane, and their dimensions or relations determined to a surprizing extent. In

Plate VII., Fig. 9, *aa'* and *bb'*, are supposed to be perpendicular to the plane ABDC; and *a' b'* represents the projection of the line *ab*, on that plane. In like manner, *b''* and *a''* are the projections of *b* and *a* on the plane GHIB, and *d'* and *c'* are the same projections when this plane is revolved down into the position GKFB.

When all the projecting lines and planes are perpendicular to the planes of projection; that is, when the eye is supposed to be at an infinite distance above, or in front of the object, the projection is then said to be *Orthographic.* When the eye is supposed to be placed comparatively near to the object, or objects, so that the projecting lines diverge from the eye as a focus or centre, then the projection is said to be *Scenographic*, which is the same as *Perspective;* and the plane of projection, is, in this connection, termed the *perspective plane.* The name of *Spherical Projections*, is applied both to the orthographic and scenographic projections of the sphere, with its different circles: and, in this case, the plane of projection is called the primitive plane; and its intersection with the sphere is called the primitive circle. In the *Stereographic projection*, the primitive plane is supposed to pass through the centre of the sphere, and the eye to be placed at one pole of the primitive circle, viewing the opposite hemisphere. In this case, all circles of the sphere are projected either as circles or right lines; as in Plate VII., Fig. 11. If the eye were revolved down to A, the point *d* would evidently be seen as if it were at *d''*; but if the eye were revolved about AB as an axis, to the point D, then the point *d* would appear in the direction *d'*. Thus, the parallels and meridians are determined. In the *cylindrical projection*, or developement of the sphere, which is that used in the Mercator Charts, the eye is supposed to be placed at the centre, and the surface is projected on a circumscribed cylinder, tangent to the sphere, around the equator; which cylinder is afterwards developed, or spread out, as a plane. Of the other projections, and of *warped surfaces*, and *surfaces of revolution*, we have no farther room to speak.

CHAPTER IV.

ANCYLOMETRY.

ANCYLOMETRY, or Analytic Geometry, is that branch of Mathematics in which Algebra is employed in determining the relations and properties of Geometrical figures; or, in other words, it is the application of Algebra to Geometry. We venture to propose, for this branch of Mathematics, the name of *Ancylometry*, suggested by Judge Woodward, and derived from the Greek αγχυλος, a curve, and μετρον, a measure; it being extensively employed in the measure of curves. Under this head, we comprehend not only *Conic Sections*, which it is generally made to include; but also *Trigonometry;* which, though sometimes considered as a distinct branch of Mathematics, may rather be regarded as a sub-branch, of limited extent, but of high importance. The object of Trigonometry, is the relation of the parts of triangles; by which, certain parts being given, the others may be determined. Conic Sections, is the name applied to the study of the curves formed by the intersections of a plane and a cone; that is, the circle, ellipse, parabola, and hyperbola. These curves are often referred to, particularly in Astronomy and Navigation; while Trigonometry is also of frequent service, in these studies, and in the practice of Surveying and Mensuration.

Trigonometry, derives its name from the Greek τριγωνος, a triangle, and μετρον, a measure. It is said to have been first investigated by Hipparchus: but the oldest work extant upon it, is that of Menelaus of Alexandria; and the earliest trigonometrical tables which have been preserved, are those of Ptolemy, in his Almagest. The Arabians simplified Trigonometry, by the introduction of *sines*, or the half chords of double arcs, as the means of expressing angles: a method employed in the writings of Albategnius, about A. D. 880; though its invention is also claimed for the Hindoos. The Arabian astronomer, Geber ben Aphla, in the 11th century, compiled three or four theorems, which became the basis of modern trigonometry. Müller, of Germany, called also Regiomontanus, farther improved Trigonometry by the use of *tangents*: and he was the first to resolve spherical triangles, by finding the relations of their sides and angles. To Napier, we are indebted, for his rules or *Analogies*, which assist us in remembering the more difficult formulas; and especially for the invention of Logarithms, by which trigonometrical calculations are so greatly simplified. Other improvements have been made by Euler and others; and the formulas of Trigonometry are now become so general, and complete, as to leave but little more to be expected, or even desired.

The first examination of *Conic Sections*, has been attributed by some writers to Menechmus, a friend of Plato; and by others to Aristæus, whose writings are lost. The earliest work extant, on this subject, is that of Apollonius of Perga, who flourished about 150 B. C.; and who ranked next to Archimedes, as a geometer. Dr. Wallis, in 1655, introduced the method of studying these curves without any necessary reference to their being sections of a cone. Galileo, Kepler, and Newton, discovered that the orbits of the planets are curves of this class; since which discovery they have been very extensively and carefully studied.

The invention of the modern Analytic Geometry, is attributed to Vieta, and Descartes. Vieta applied it only to the construction of the roots of equations; but Descartes, in 1637, by the invention of coördinates, found the means of designating geometrical curves by algebraic equations; in which the essence of this branch consists. Descartes applied this system to curves of double curvature, by means of their two projections; but Maclaurin discovered a more direct method, by means of triple coördinates, parallel to three different axes, and related to each other by the nature of the curve, or surface. It is only since the time of Descartes, that Trigonometry and Conic Sections have been treated analytically, and thus become a part of this branch of Mathematics; which has thus aided the study of pure Geometry.

We proceed to treat first of Trigonometry; then of Coördinates, and their immediate applications; and lastly of the Conic Sections.

§ 1. *Plane Trigonometry*, has for its object the solution of problems concerning plane triangles; the sides of which are always straight lines. It is subdivided, in reference to the different kinds of triangles, into Right Angled and Oblique. In any right angled triangle, ABC, Plate VII. Fig. 13, if, from the vertex, A, of one of the acute angles, as a centre, and with the hypothenuse, AC, for a radius, we describe an arc of a circle, the side, BC, opposite to the vertex used, becomes the *sine*, and the adjacent side, AB, becomes the *cosine*, of the angle, A, in question. The cosine, prolonged, becomes another radius of the same arc; and the prolonged part, BD, beyond the triangle, is called the *versed sine* of the arc or angle in question. If now we apply a scale, on which the hypothenuse or radius shall be equal to unity or 1, the sine and cosine will be expressed by decimals, which are called the *natural sine*, and *cosine*, of the angle in question. But if we take the radius equal to 10,000,000,000, (whose logarithm is 10), and then find the logarithms of the corresponding lengths of the sine and cosine, we shall have the *logarithmic sine*, and *cosine*, of the same angle. Thus, angles may be designated by their sines, or cosines.

Again, if from the same vertex, A, as a centre, and with the base, AB, as a radius, we describe an arc, then the other leg, BC, is called the *tangent*, and the hypothenuse, AC, is called the *secant* of the same angle. The tangent and secant of the *complement* of an angle, or what it wants of 90°, are called the co-tangent and co-secant of the angle itself. It is chiefly by means of *Tables* of the sines and co-sines, tangents and co-tangents of angles, that all problems of Trigonometry are resolved. In every plane triangle, we must have given at least three parts, sides and angles, one of which at least must be a side, in order to find the other parts.

Thus, in a *right angled triangle*, if we have given the base, and angle at the base, the right angle being of course known, then, the base is to the perpendicular, or other leg, as the cosine of the angle at the base, is to the sine of the same angle; and the base is to the hypothenuse, as the cosine of the angle at the base, is to radius, or the sine of 90°. In an *oblique angled triangle*, the sides are proportional to the sines of the opposite angles: also, the sum of any two sides is to their difference, as the tangent of the half sum of the two opposite angles, is to the tangent of their half difference: and finally, the sine of half of either angle, is equal to radius multiplied by the half sum of the three sides minus one of the adjacent sides, this multiplied by the same half sum minus the other adjacent side, and the whole divided by four times the product of the two adjacent sides, adjacent to the angle sought.

§ 2. *Spherical Trigonometry*, has for its object the resolution of spherical triangles, formed by arcs of great circles on the surface of a sphere. The angles of such a triangle, (Plate VII. Fig. 14), are those formed by the planes of its sides, with each other; and its sides are measured as arcs, by the number of degrees which they subtend, at the centre of the sphere. In spherical triangles, the sines of the sides are proportional to the sines of the opposite angles. In a right angled spherical triangle, if we omit the right angle, we have five parts left, sides and angles; one of which being called the middle part, two of the others become adjacent parts, and the other two, the opposite parts; taking however not the oblique angles and hypothenuse themselves, but their complements in their stead. Then, radius into the sine of the middle part, will be equal to the product of the tangents of the adjacent parts, and also equal to the product of the cosines of the opposite parts. These rules, called *Napier's Analogies*, may be applied to oblique angled spherical triangles; by dividing them each into two right angled triangles, by means of an arc drawn from one vertex, perpendicularly, to the opposite side.

§ 3. The invention of *Coördinates*, has furnished the means of representing geometrical curves, by the medium of algebraic equations. For this purpose, we imagine two straight lines, XX′ and YY′, Pl. VII., Fig. 15, to be drawn in the plane which contains the given curve; and these lines are called the *axes of coördinates:* the *origin* of coördinates being their point of meeting. Generally, the axis which extends across the figure, from right to left, is called the axis of *abscissas;* and the other, the axis of *ordinates*. If, then, from any given point, m, we draw a vertical line, $m\,n$, until it meets the axis of abscissas, this line is called the *ordinate* of that point; and the distance, An, from the foot of this ordinate, on the axis of abscissas, to the origin of coördinates, is called the *abscissa* of the same point. Thus, the position of the point, in the plane under consideration, is fixed by means of its abscissa and ordinate; which, being parallel to the axes, are generally perpendicular to each other, and together are called the coördinates of that point.

Suppose, now, that we imagine a series of points, at different distances from the origin of coördinates, but so situated that the ordinate of each point shall be equal to its abscissa. Then will all these points lie in one and the same straight line, $A\,b$, Fig. 15, passing through the origin, and making an angle of 45° with each of the axes, when they are rectangular: and the equation of this straight line would be $y = x$; calling x the abscissa, and y the ordinate, in general. By giving any particular value to x, it determines the corresponding value of y, and defines some particular point of this straight line. For the origin itself, we have $x = 0$, and $y = 0$. and in general the abscissa will be 0 for any point situated on the axis of ordinates, and the ordinate will be zero for the axis of abscissas. In like manner as above, the equation $y = \frac{1}{2}\,x$, is that of a line, AC, Fig. 15, passing through the origin, and having the ordinate for each point, the double of its abscissa. A line whose equation is $y = \frac{1}{2}\,x + 10$, would be parallel to this last, but would cut the axis of ordinates at a distance from the origin expressed by the number 10. The equation $y = -\frac{1}{2}\,x + 5$, might represent the line $d\,e$, Fig. 5; the coëfficient $-\frac{1}{2}$, determining its oblique direction.

§ 4. We must pass on to the *Conic Sections*. If we suppose a cone, (Plate VII., Fig. 16), to be bounded by an infinite number of consecutive straight lines, all passing through its vertex, V, and together composing its convex surface, these lines are called its *elements;* and in a right circular cone, they all form equal angles with its axis. Every section of such a cone, by a plane parallel to its base, or perpendicular to its axis, is a *circle*, as EF; which curve is therefore one of the conic sections. If the cutting plane be oblique to the axis, but make with it a greater angle than the elements do, then the section will be an *ellipse*, as GH; which is a curve returning to itself like a circle, but elongated in one direction. If the cutting plane make with the axis the same angle that the elements do, the section will be a *parabola*, as IJK: but if it make with the axis a smaller angle than this, the section will be a *hyperbola*, as LMN, OPQ. The ends, or branches of a parabola, or hyperbola, never meet, but go on diverging to an infinite distance.

If we suppose the elements of the cone CVD to be prolonged beyond the vertex, they will form another cone, AVB, equal and opposite to the first; both having a common vertex. These two, in connection, are technically called a *cone of two nappes.* If we consider them both as extended to an infinite distance from the vertex, the plane which cuts out a hyperbola from one of them, will cut out an equal and opposite hyperbola from the other; and these two are called *conjugate hyperbolas.* A cylinder, may be regarded as a cone, whose vertex is at an infinite distance from its base: and its sections, by planes, whether circular or elliptical, belong therefore to the conic sections. All the conic sections may be comprehended in one general equation; by varying the terms of which it is made applicable to every particular case.

In the *circle*, Fig. 12, if we take two diameters for the axes of coördinates, and consider any point C, on the circumference, its ordinate, CD, will be the same line as the sine, and its abscissa, OD, as the cosine, of the arc between this point and the diameter which is made the axis of abscissas. Calling the radius, R; the abscissa, x; and the ordinate, y; the equation of the circle will be $y^2 + x^2 = R^2$; in which x, and y, vary for the different points of the circumference; y diminishing as x increases, but R remaining constant for all points of the same circle. In the *ellipse*, Fig. 17, the longest of all the diameters is at right angles to the shortest; the former, being called the *transverse* and the latter the *conjugate* diameter. Taking these as axes, and calling the halves of them respectively A and B, the equation of the ellipse becomes $A^2 y^2 + B^2 x^2 = A^2 B^2$; in which A and B remain constant for the same ellipse. The points F and F′, are called the *foci* of the ellipse: and the sum of their distances FP and F′ P, from any point on the curve, is a constant quantity, always equal to the transverse diameter. In the hyperbola, Fig. 19, the difference of the distances F′ P and FP is constant; and in the parabola, Fig. 18, the point P is equidistant from the focus F, and the directrix CD. The equation of the *parabola*, taking its vertex as the origin of coördinates, is $y^2 = P x$; and that of the *hyperbola*, referred to the middle of its transverse diameter, is $A^2 y^2 - B^2 x^2 = - A^2 B^2$. The applications of these equations, we have no room to explain.

CHAPTER V.

RHEOMETRY.

Rheometry, or the Differential and Integral Calculus, is that branch of Mathematics which treats of the correlative increments of quantities that are mutually dependent; and of the relations of these increments to each other, and to the quantities from which they are derived. For this branch of Mathematics, we venture to propose the name *Rheometry;* from the Greek ῥεω, I flow, suggested by the name Fluxions, applied to this science by Newton. The word *Calculus*, is the Latin for a small stone, or pebble; and as the ancients used pebbles to assist them in numbering or reckoning, the word was hence applied to the method or means of numerical calculation. Leibnitz conceived the dependent quantities to receive infinitely small increments, the sum of which would make up the quantities themselves: hence he proposed for this branch the name above given. Newton considered all quantities as generated by motion; a line by the motion of a point; a surface by the motion of a line; and a solid by the motion of a surface. This idea of magnitudes moving, or *flowing*, led him to propose for this new science, the name of *Fluxions;* which is now, however, for the most part superseded by the name proposed by Leibnitz.

Kepler was the first, among the moderns, who applied the infinitesimal method to geometrical figures; and he considered the circle as composed of infinitely small triangles, formed by the radii. The *method of indivisibles*, first published in 1635, by Cavalieri, or Cavallerius of Bologna, regarded surfaces as made up of mere lines; whereas Roberval, his contemporary, regarded them as composed of infinitesimal areas; and applied this method to the measure of the cycloid. Fermat's method of finding *maxima and minima*, improved by Descartes, in his method of tangents, and still farther extended by Wallis of England, in his Arithmetic of Infinites, on the quadrature of curves, as also by Huyghens, in his theory of evolutes, was among the successive steps which led to the invention of the Differential Calculus. This invention has been claimed both for Newton, and Leibnitz; but the question has never been fully decided. Newton is said to have invented his method of Fluxions as early as 1672; but he made no publication of it till that in his Principia, in 1686. Leibnitz claims to have invented the Calculus in 1676; and the first publication of it was made by him in 1684, in the Leipsic Acts, under the title of A New Method for Maxima and Minima; but it contained no demonstrations. Leibnitz gave the first ideas of the Integral Calculus, in two small tracts, on the quadrature of curves, published in 1685.

From this time, the new calculus made rapid advances, in the hands of its inventors and others; and its great utility was shown in its successful application to many of the more difficult problems in physical science, which had never before been resolved. The first regular treatise on the Differential Calculus, was the Analysis of Infinites, published in France, in 1699, by the Marquis de L'Hôpital; and the first elementary treatise upon it in England, was published by Hayes, in 1704. Brook Taylor's theorem, published in 1715, and Maclaurin's theorem, deduced from Taylor's, have become the basis of the calculus of finite differences, or increments and series, on which Lagrange has founded his whole theory of the Calculus. Maclaurin, in his Treatise of Fluxions, published in 1742, first subjected the principles of this science to strictly geometrical proof; and they were demonstrated analytically by Lagrange, in 1772.

James Bernouilli, a friend of Leibnitz, distinguished himself by the application of the Calculus to the elastic spring, the logarithmic spiral, and to the most difficult isoperimetrical curves: and his brother John Bernouilli, though doubtless his inferior, did much to promote this science; particularly in his examination of exponential functions, about the year 1697; and in his application of Leibnitz's method of differencing from curve to curve. The important method of *partial differences*, first applied by Euler, was extended by D'Alembert, in studying the vibrations of a musical string; and still farther extended by Euler himself, in his Investigatio Functionum, published in 1762. La Grange, in 1760, invented the *Calculus of Variations;* which Euler was one of the first to adopt, and which La Place has successfully applied to the planetary perturbations. The developement of functions in series, has been facilitated by the labors of La Place; as also by Hindenburg's combinatory analysis, and by Arbogast's calculus of derivations, invented in the year 1800. Of farther improvements, by Clairaut, Fontaine, Legendre, Cousin, and others, we have no room here to speak.

Our further notice of this science will be very brief, and comprised under the two divisions of the Differential, and the Integral Calculus.

§ 1. The immediate object of the *Differential Calculus*, is, having given the relation of two quantities, or fluents, to find the ratio of their differentials, or fluxions. The name of *differentials* is given to the increments of quantities, when supposed to become infinitely small or zero; but though the increments themselves thus disappear, their ratio or proportion to each other does not disappear, but becomes an exact and definite mathematical quantity, having important applications. In this branch of mathematics, quantities are considered as either *constant*, or *variable;* the former being expressed by the first, and the latter by the last letters of the alphabet. When the value of one quantity depends upon that of another, the former is said to be a *function* of the latter. Thus, in the equation, $y = ax + b$, y is said to be an *explicit function* of x; and x is said to be an *implicit* or implied function of y; but a and b represent constant quantities. In this example, if x increases in value, y is also increased; and hence y may be called an *increasing* function of x. Functions are also distinguished as either *algebraic* or *transcendental;* the latter being either logarithmic, or circular functions, which cannot be expressed by a limited number of algebraic terms, but only by a series; as $y = \log. x$, or $y = \sin x$.

Resuming the equation $y = ax + b$, which is that of a straight line, (p. 335), if we give to x an increment h, and the corresponding increment of y be k, then the equation becomes $y + k = a(x + h) + b = ax + ah + b$; and, from this, subtracting the original equation, we have $k = ah$, or $\frac{k}{h} = a$; which shows that in an equation of the first degree, corresponding to a straight line, the increments of the variables, or of the ordinate and abscissa, have a constant ratio. But if we take the equation of a *circle*, $y^2 + x^2 = R^2$, or $y^2 = R^2 - x^2$, which is an equation of the second degree, hence belonging to a curve of the second order, and if we give to x and y the corresponding increments h and k, we have $(y + k)^2 = R^2 - (x + h)^2$; or $y^2 + 2ky + k^2 = R^2 - x^2 - 2hx - h^2$: and subtracting the original equation from this, we have $2ky + k^2 = -2hx - h^2$; in which the *ratio* of k and h varies, whether we vary x and y, or change the values of k and h themselves. But if we make these increments infinitely small, their squares k^2 and h^2 will become infinitely small, even compared with k and h; and hence may be neglected; so that we then have the equation $2ky = -2hx$; or $\frac{k}{h} = -\frac{x}{y}$. In this case, k and h become the differentials of x and y, and are expressed by writing the letter d before the quantity from which they are derived.

Thus, when we *pass to the limit*, by making k and y infinitely small, the last equation becomes $\frac{dy}{dx} = -\frac{x}{y}$; from which we have $dy = -\frac{x}{y}dx$, for the first differential equation of the circle. The *ratio* of the increments, that is, $-\frac{x}{y}$, is technically called the *differential co-efficient;* and it expresses the tangent of the angle which a tangent line to the circle, at the point whose coördinates are x and y, makes with the axis of abscissas. This furnishes us with an easy mode of drawing a *tangent line* to the circle, at any point whose coördinates x, and y are given. Moreover, if the value of y, after increasing to a certain extent, should reach its greatest limit, this will be shown by dy becoming infinitely small, or zero, in comparison with dx; that is, we shall have in this case $\frac{dy}{dx} = 0$; or $-\frac{x}{y} = 0$; or $-x = y \times 0 = 0$, showing that the greatest value of y is that which corresponds to $x = 0$. From this, the *maximum* value of y itself may be found, by making $x = 0$ in the original equation; which, for this value, gives $y = R$. The *minimum* value of y, is found on precisely the same principle, and by the same method; from which we perceive the ready application of this Calculus to problems of maxima and minima.

We have only room remaining to give some of the simplest rules for differentiating quantities, in order to find the differential equations. The differential of ax, is $a \, . \, dx$; and that of a constant term is zero; so that constant terms have no influence on the differential equation; as shown by the term R^2 in the last example. The differential of

xy is $x.dy + y.dx$: that of x^2 is $2x.dx$; and that of x^3 is $3x^2 dx$. In general, the differential of a product, is found by multiplying the differential of each variable by the product of all the other variables, and taking the sum of these several products. The differential of $\frac{x}{y}$ is $\frac{y.dx - x.dy}{y^2}$: the differential of the sine of x is $\cos x . dx$: the differential of the cosine of x is $-\sin x . dx$: and that of the logarithm of x is $\frac{dx}{x}$. By differentiating anew the first differential equation, we obtain the second differential equation, and from this the third, and higher equations; which are necessary in the application of Taylor's and Maclaurin's theorems: but these, we have no room here to explain.

§ 2. The object of the *Integral Calculus*, is, having given the differential coefficient of any function, to find the function itself. Hence, it is the reverse of the Differential Calculus; and was called by Newton the Inverse Method of Fluxions. In this view, the function is called the *integral*, or fluent; being considered as the sum of all the successive increments which together make up the function sought. To find the integral of any expression, is to find the quantity which will have that expression for its differential, or differential coefficient. Thus, the differential of $ax + b$ being $a.dx$, conversely we say that the integral of $a.dx$ is $ax + b$. The integral of any quantity, is designated by writing before it the character $\int$, resembling the letter s, the initial of the word sum; as d was used to designate the differential, by a similar alliteration. Thus we have

$$d(ax + b) = dy = a.dx; \text{ and}$$

$$\int a.dx = y = ax + b.$$

The constant term b, was called by Newton the *correction of the fluent:* and it cannot be found immediately by the integration, because this process only gives the variable terms, of which this constant term is entirely independent.

This explanation of the Integral Calculus, will serve to show how it may be applied to the *rectification* of a curve, that is, the finding of its length; or to the *quadrature* of a surface, that is, the finding of its area; or to the *cubature* of a solid, by which we measure its solidity. Taking, for example, the quadrature of the *parabola*, the equation of which is $y^2 = 2px$; (p. 336); and calling s the area comprehended between the axis, the curve, and a given ordinate y, (or PH, Plate VII., Fig. 18,) we assume the equation $ds = y.dx$; each member expressing the infinitely small area comprehended between two consecutive ordinates: and substituting, in this, the value of dx, found from the differential equation, $2y.dy = 2p.dx$, which gives $dx = \frac{y.dy}{p}$, we have $ds = \frac{y^2.dy}{p}$; the integral of which is $\int ds = s = \frac{y^3}{3p}$. This integral requires no correction, or constant term, because it already makes the area $s = 0$ when y becomes zero, which the case requires. We have then $s = \frac{y^3}{3p}$; or since $y^2 = 2\,px$, we have $s = \frac{y \times 2\,px}{3\,p} = \frac{2\,x\,y}{3}$; and showing that the area in question is two-thirds of the product of the abscissa and ordinate by which the area is included. Such are the beautiful applications of the differential and integral calculus.

X. DEPARTMENT:

ACROPHYSICS.

In the department of Acrophysics, we include those branches of science which relate to the dynamical laws of matter, or the agencies by which the inanimate material world is regulated. The name is derived from the Greek, ακρος, high, and φυσις, nature; properly signifying the higher study of nature; that is, as regards material objects. The term *Physics*, has been variously applied; sometimes limited to the mathematical, and at others extended to the chemical laws of matter; sometimes including both Natural Philosophy and Natural History, but more frequently confined to the former. Hence the desirableness of a generic term, which, being strictly defined, may designate exclusively the class of sciences constituting the present department. The term *Natural Philosophy*, might suffice for this purpose, were it not liable to ambiguity: but it sometimes excludes Astronomy; and is generally considered as exclusive of Chemistry; although we have high authority for regarding this latter branch as a part of the same group of sciences.

In the department of Acrophysics, we therefore place not only Mechanics, Optics, Electricity, and Calorics, which are usually comprehended under *Natural Philosophy;* but also the branches of Astronomy and Chemistry; as chiefly relating to the general laws, though partly to the special productions of nature. Most of these sciences depend more or less on the pure mathematics for their elucidation; and hence were formerly, and are still occasionally designated as *Mixed Mathematics*. But the data, or facts, to which the calculations are applied, we obtain chiefly from observation and experiment: hence these branches have also been comprehended under the name of *Experimental Philosophy;* though this term is most frequently applied to the studies of Optics, Electrics, and Calorics. The uses to which this department of science may be applied, are numerous and important; not only in dispelling superstition, and elevating the mind, by explaining the wonderful phenomena and operations of nature; but in aiding the physical arts, by a knowledge of the facts which they require, for their successful practice, and farther improvement.

By the general term, *matter*, is meant any substance which is capable of affecting our senses. Matter exists in three states; *solid*, *liquid*, and *gaseous*. In the first, the particles cohere together, so as not to be freely separated; in the second, they cohere slightly, but separate freely; and in the third, or aeriform state, they not only separate freely, but tend to recede from each other, as far as the space which they occupy, or pressure which they experience, will allow. Liquids and gases are both termed *fluids;* the former incompressible, or nearly so; the latter compressible and elastic. The effects of light, heat, and electricity, are usually attributed to one or more fluids, pervading all space; but too subtile and diffusive to be collected and weighed, and hence termed *imponderable.* Concerning the constitution of matter, there are two opposite theories. The *dynamic theory*, supposes that matter is continuous, without any atomic organization, and without any pores or interstices. The *atomic theory*, supposes all matter to consist of insensibly small, or ultimate particles, called *atoms;* each having a regular, and probably a rounded shape; with interstices between them, like those in a pile of cannon balls. This theory is now generally adopted; and it is strongly supported by the laws of crystallization, and of chemical combination in definite proportions.

There are two essential properties of matter, without which we cannot conceive of its existence. They are extension, and resistibility. *Extension*, is that property of matter by which it must occupy a certain space; and *resistibility*, less properly called impenetrability, is that property by which it will not permit other matter to occupy the same space at the same time. Four other properties of matter may be termed *general;* as they belong to all matter with which we are acquainted; though not essential to its existence. They are gravitation, inertia, porosity, and divisibility. *Gravitation*, is that property of matter by which it tends to move towards other matter, unless prevented by some force, to which, in that case, it opposes a certain pressure or resistance: and *inertia*, is that property of matter by which, being at rest, it tends to remain at rest, or being in motion it ever continues in motion, unless affected by some extraneous force. *Porosity*, is that property of matter by which, according to the atomic theory, it presents interstices or pores between its particles: and *divisibility*, is that property by which matter may be resolved into particles, at least as small as our vision will permit us to discover. Of the remaining properties of matter, which may be termed *accidental*, such as color, shape, hardness, elasticity, and the like, we have no room here to speak.

The progress of Acrophysics, was necessarily dependent, in a great measure, on that of Mathematics; and its study has been a great stimulus to mathematical inquiries, by clothing them with new interest and importance. How much knowledge in this department was possessed by the ancient Chaldeans and Egyptians, we are unable exactly to ascertain; but it appears to have been considerable, and derived from one common source. Their knowledge of these sciences was carried into Greece, by Thales and Pythagoras; in whose doctrines truth was often mingled with error. Thus, Thales taught that *water* was the sole element, of which all things were composed; and he believed amber, and the magnet, to be animate beings. Pythagoras attached a mysterious importance to certain numbers, as exercising a control or influence over the material world. Anaximenes and Diogenes regarded *air* as the primary element, of which even water was composed; and Heraclitus maintained that *fire* was the primary element, into which all others might be resolved. Empedocles admitted the existence of four elements; fire, air, water, and earth; and considered light as also a material substance. Aristotle maintained the idea of a series, or succession of elements; the highest being the lightest: and he regarded *matter*, *form*, and *privation*, as the three great agents by which the world is controlled. (p. 20.)

We have now pointed out some of the errors of the ancient philosophers; reserving the truths which they discovered for the history of the different branches of Acrophysics. We may add that Archimedes thought it beneath the dignity of philosophy to write explanatory and practical works on the sciences; which, perhaps, was the greatest error that this profound philosopher ever entertained: as it caused the loss of much valuable information to succeeding ages. The knowledge of the ancients, in this department of science, was preserved in part by the Arabians; and by them transmitted to modern Europe, with some important additions. (p. 289). Among the earliest pioneers of modern science, we may mention Roger Bacon, an English monk or Friar, whose discoveries in optics and chemistry deserve an honorable mention. Still, the limits of physical truth were confined, and its march impeded, in his time, by the metaphysical subtleties and vagaries of the schoolmen, based on the high authority of Aristotle. To Francis Bacon, Lord Verulam, whose profound work, entitled "Novum Organum Scientiarum," in contradistinction from the Organon of Aristotle, first unfolded the right method of studying nature, by observation, experiment, and a careful induction of principles from numerous and well known facts; to him is modern science indebted, at least in a considerable degree, for its rapid and continuous progress, among all enlightened nations, down to the present time.

Of the Acrophysical sciences, *Astronomy* was the first to emerge from darkness, when Copernicus and Galileo revived the true solar system; the theory of which has since been developed by Newton and La Place. Galileo also laid the foundation of *Dynamics*, or the theory of variable motion, with which the ancients were slightly or not at all acquainted: and his pupil, Torricelli, originated the science of *Pneumatics*, by discovering the ponderability of the air. The prismatic decomposition of Light, by Newton, gave a new impulse to the study of *Optics*, which had previously been limited to a few of the more common phenomena of reflection and refraction. The discoveries of Dr. Gilbert, first elevated *Magnetism* to the rank of a science; and formed a nucleus on which has arisen the kindred science of *Electricity*. Galvanism originated, in the last century, with the discoveries of Professor Galvani; and Electro-Magnetism, in the present century, with those of Professor Oersted; to which Dr. Seebeck has since added a new class of phenomena, in those of Thermo-Electricity. *Chemistry* first took a scientific form in the hands of Beccher and Stahl; though its true theory was more recently made known by Lavoisier and Dalton. To Dr. Black we are indebted for the initial discoveries in Pneumatic Chemistry, and some of the most important laws of Calorics.

Thus rapid and brilliant has been the modern progress of the sciences included in the present department. We proceed to treat of them, in the brief manner here required, under the branches of 1. Mechanics; 2. Astronomy; 3. Optics; 4. Ceraunics, including Calorics, Electricity, Magnetism, and Galvanism; and 5. Chemistry.

CHAPTER I.

MECHANICS.

Mechanics, is the science which treats of forces acting upon matter, and which investigates the laws of equilibrium and motion, both of solids, and of fluids. The name is derived from the Greek μηχανη, a machine; as the construction of machines probably first led to the study of this science. The term *matter*, has been already defined, and the principal properties of matter explained, in the introduction to this department. A *force*, is an agent, tending either to produce or to resist motion. When the forces acting upon a body counteract each other, or do not produce any motion, the body is said to be *in equilibrium*. When a body moves through equal spaces in equal times, its motion is said to be *uniform;* but in all other cases it is *variable*. In the former case, the forces cease to act, or else counteract each other: but all cases of variable motion are owing to the action of continuous or incessant forces.

The best sub-division of Mechanics, is probably into the four heads of Statics, Dynamics, Hydrics, and Pneumatics. *Statics*, treats of the conditions of equilibrium, and of uniform motion, particularly in regard to solids; though many of its principles are also applicable to fluids. *Dynamics*, treats of the laws of variable motion; with the same restriction concerning its application. *Hydrics*, including both Hydrostatics and Hydrodynamics, treats of those laws of equilibrium and motion which are peculiar to liquids; and *Pneumatics*, treats of the corresponding laws, in so far as they are peculiar to aeriform fluids, or gases. The term Hydraulics, more properly applies to those constructions for the conveyance of water, the study of which belongs to Civil Engineering; and Acoustics, or the doctrine of sound, may properly be included under the head of Pneumatics. The science of Mechanics, finds its applications not only in the construction of Machinery, but also in the succeeding branches of the present department; to some of which, the study of it is an indispensable preliminary.

According to Vitruvius, the ancients were from time immemorial acquainted with several of the mechanical powers, so called; as the inclined plane, capstan, and pulley; to which, no doubt, should be added the wedge, and the lever, as the simplest of them all. The screw was also known to, if not invented by, Archimedes; to whom the theory of the mechanical powers is justly attributed. The most ancient writings extant, on this science, are those of Aristotle; who understood the principle of *momenta*, but not that of the lever. This latter principle was first discovered by Archimedes; who deduced from it the principle of the *centre of gravity*, as explained in his work entitled *Isoporrika*, concerning equiponderants. He also discovered the important law of the *equilibrium of fluids;* and applied it to the finding of specific gravities, in the celebrated problem of Hiero's crown. The invention of *pumps* for raising water, is due to Ctesibius, and Hero, of Alexandria, 150 to 120 B. C.: and the first correct ideas on the motion of water in *canals*, belong to Frontinus of Rome, who flourished A. D. 100. The initial theory of Acoustics, or at least of musical sounds, belongs to Pythagoras; and was suggested, it is said, by the concordant notes of several hammers, whose weights he found to have a certain ratio.

The discovery of the *parallelogram of forces*, was made by Stevens, or Stevinus of Holland, about A. D. 1600; to which Varignon afterwards added the ratio of the sines of the angles. Galileo discovered the *laws of falling bodies*, and invented the *pendulum;* thus founding the branch of Dynamics. Torricelli's discovery of the *pressure of the air*, and his invention of the *barometer*, were in like manner the basis of Pneumatics, as already mentioned. Pascal first noticed the principle of the *transmission of pressure*, afterwards applied by Bramah to the hydrostatic press; and Mariotte discovered the law of pressure in gases when confined. Huyghens invented the *cycloidal pendulum*, and explained its peculiar properties; and contemporaneously with Wallis and Wren, he demonstrated the laws of collision of bodies. Newton, in his *Principia*, or Principles of Natural Philosophy, investigated the resistance of the air, and first revealed the great law of *Universal gravitation*. Euler, by a happy analysis, generalized the theorems of Mechanics, and reduced the whole to a system of analytical formulas. James Bernouilli studied the centre of percussion; D'Alembert discovered the principle of efficient and residual forces; Coulomb investigated the laws of friction; and Prony, those of running water: but many other discoveries, in this branch of science, it is beyond our limits to notice.

We proceed to explain some of the leading principles of mechanics, under the four heads of Statics, Dynamics, Hydrics, and Pneumatics.

§ 1. The science of *Statics*, relates to the conditions of equilibrium and of uniform motion, applied particularly to solid bodies. A force is *measured*, by the velocity which it communicates to a given mass: and the *momentum*, or quantity of motion, is equal to the product of the mass into the velocity. The *mass*, is represented by the weight; and is equal to the product of the *bulk* by the *density;* which latter is the weight of the unit of mass. The *velocity* of a body, is the space over which it moves in a unit of time; as so many feet per second. The *resultant*, of two or more forces, is a single force, which might take the place of them all, and produce the same effect. The forces which together are equivalent to the resultant, are called *components*. A force equal and opposite to the resultant, may be called a *quiescent force;* as it produces equilibrium.

If two forces act in the same straight line, their resultant is equal to their sum, or difference, according as they act in the same, or in opposite directions. If two component forces are oblique to each other, but lie in the same plane, they will meet, and may be represented by the two contiguous sides of a *parallelogram;* having the directions of the forces for those of the sides, and the momentum of the forces proportional to the lengths of the sides; in which case the diagonal will represent the *resultant*, both in momentum and direction. The *moment*, or leverage, of a force, is the product of its momentum by the perpendicular distance from it to a fixed point called the *origin of moments:* and it measures the tendency of the force to turn the body around the origin, considered as a fixed axis. In any system of forces, the moment of the resultant is equal to the sum of the moments of all the components. This important fact is called the principle of moments. The *centre of gravity*, of any body, or system, is a point through which will pass the resultant of all the component forces of gravity, acting on the different particles, or parts of the system. It may be found by the principle of moments; and if this point be supported, the whole body is supported thereby.

The *rope machine*, or funicle, consisting of forces acting on three or more cords, or ropes, connected together at one point, is sometimes regarded as a mechanical power. There are, however, usually reckoned six *mechanical powers*, or simple machines for rendering forces more available; viz. the lever, wheel and axle, pulley, inclined plane, screw, and wedge. The *lever*, is essentially an inflexible rod or bar, supported by a fulcrum, either a prop or a pivot, and acted upon by two or more forces tending to turn it, or to resist its turning. In the case of the balance, or steelyard, the forces, when in equilibrium, are inversely as their distances from the fulcrum. In the *wheel and axle*, capstan, or windlass, the forces are inversely as the radii on which they act. In the simple fixed *pulley*, the power is equal to the resistance, but acts in a different direction; whereas, in the simple moveable pulley, the weight supported by the pivot, is double the force at either end of the rope.

In the *inclined plane*, the force parallel to the slope, is to the weight of the body which it sustains, as the height to the slope. In the *screw*, acted upon by a lever, the power is to the resistance, as the distance between the spiral threads, is to the circumference described by the power. In the common *wedge*, the forces are as the length of the sides against which they act. Such are the ratios required to produce equilibrium; but, having regard to friction, the forces must be considerably augmented when they are designed to produce motion. The principle of *virtual velocities*, is, that whatever is gained in the pressure exerted, or mass moved, is compensated for by the greater space which the power must move over: so that what is gained in weight is lost in velocity. *Friction*, always acts as a retarding force, proportional to the pressure which produces it.

§ 2. *Dynamics*, treats of variable motion, produced by continuous forces, applied particularly to solid bodies. An *impulsive force*, is one which acts momentarily; or is imparted momentarily, from one body to another. The body receiving it, moves consequently in a right line, and with a uniform motion, unless affected by the resistance of the air, or by gravity, or other forces; and when it strikes another body, it communicates to the latter a part, at least, of its own force. A *continuous force*, is one which acts continually; either increasing or diminishing the velocity, if it acts on a free body, or changing the direction of motion; or producing these effects conjointly. *Gravity*, is a continuous force, which, near the earth's surface, produces equal *increments* of velocity in equal times; and hence it is called a *constant force;* being the cause of bodies having weight, and of their falling, when unsupported.

A body falling freely, descends through 16 feet in one second; at the end of which time it is falling at the *rate*, or with the velocity of 32 feet per second. At the end of two seconds, it will have fallen four times as far, and at the end of three seconds, nine times as far, as in the first; the space increasing as the square of the time. Calling t the time in seconds; v the velocity in feet; s the space fallen through; and taking $g = 32$ feet, as the measure of the force of gravity; we have $v = g\,t = 32\,t$; and $s = \frac{1}{2}\,g\,t^2 = 16\,t^2$; and consequently, $v^2 = 2\,gs = 64\,s$: for problems concerning bodies falling vertically, or for their *vertical* descent, when falling obliquely. In the case of a ball thrown obliquely upwards, if there were no resistance of the air, its *projectile curve* would be a parabola; and calling x and y the horizontal and vertical coördinates of this curve, a being the angle of elevation above the horizon, and v the initial velocity, its equation would be $y\,v^2 \cos^2 a = x\,v^2 \sin a \cos a - \frac{1}{2}\,gx^2$. But the resistance of the air, which is proportional to the square of the velocity, diminishes the *random*, or distance to which a cannon ball can actually be thrown, from 15 or 20 to only 3 or 4 miles.

A *pendulum*, is a rod, or thread, suspended at or near one end, usually with a weight at the other end, and made to oscillate by the force of gravity. When once set in motion, it would continue to oscillate forever, were it not for the resistance of the air, and of friction, which require that it should be kept in motion by an extraneous force, usually that of a descending weight. Calling a the length of the pendulum, in feet; t the time, in seconds, of one oscillation; g the measure of gravity, $= 32$ feet, as before; and $\pi = 3.1416$, the circumference of a circle whose diameter is unity; we have the equation $t = \pi \sqrt{\frac{a}{g}}$, for finding the time of one oscillation, by means of the length of the pendulum; it being proportional to the square root of the length, while the force of gravity remains constant.

§ 3. In the division of *Hydrics*, so named from the Greek ὕδωρ, water, we would include both *Hydrostatics*, and *Hydrodynamics;* or the laws both of equilibrium and motion, in so far as they are peculiar to liquids. All liquids, are, in theory, regarded as *incompressible;* though they are found to admit of compression in a slight degree. When enclosed, or confined, in vessels, so as to be acted on as single masses, liquids are subject to the same laws of motion and rest, as solids. But even in this case, their pressure against the sides of the containing vessel, becomes a distinct problem of Hydrics; and it is found that the pressure produced by their weight, is the same, for equal surfaces, at equal depths below the highest level of the liquid;

increasing solely with the depth, and without regard to the shape. When a close vessel is filled with a liquid, a pressure applied to any one part, is distributed and felt on every part alike.

When a body *floats* on a liquid, it displaces a bulk of liquid of equal weight with itself; and is thus supported by the upward pressure of the liquid tending to regain its level. A floating body can be in equilibrium, only when the centre of gravity is in the same vertical line with that of the liquid displaced. If the body is totally immersed, it is still pressed upwards; and if thus suspended by a thread, it will weigh less in the liquid than in the air, by the weight of an equal bulk of the liquid; which weight may thus be found. The *specific gravity* of any body, denotes the number of times that it is heavier than water, taking equal bulks of each. Thus as platinum is 21 times as heavy as water, the number 21.000 expresses its specific gravity; and cork is so much lighter than water that its specific gravity is expressed by the decimal 0·240. In the case of gases, air, instead of water, is taken as the standard of comparison.

Water, and all other liquids, have some viscidity, or cohesiveness; as shown by their collecting in drops, before, or while falling. A similar cohesion between them and the containing tubes or vessels, causes the phenomenon of *capillary attraction;* shown also in sponges, and other porous bodies; by which the water along the edges is raised above its general level. When water is confined in a bent tube, or an enclosure of any shape whatever, it tends to rise to the same *level*, or horizontal plane, in every part of its exposed surface. If there be any aperture or orifice by which it can flow out, its velocity will depend somewhat upon the shape of the aperture, but principally on its depth below the surface of the liquid: it being nearly the same velocity which a heavy body would acquire in falling freely through the same depth. Allowance must be made here for friction, and the resistance of the air.

§ 4. Under the division of *Pneumatics*, are included all the peculiar mechanical laws of elastic or compressible fluids, whether gases or vapours. *Gases*, retain their aeriform state at all ordinary temperatures and pressures; but *vapors*, are substances ordinarily liquid, which have taken the gaseous form, owing to heat or diminished pressure. The air, or *atmosphere*, is a permanently gaseous fluid, elastic and compressible, surrounding the earth on every side, and extending at least to a height of 45 miles above its surface. The lower parts of it are compressed by the weight of the upper parts, so that for each three miles that we ascend, its density is reduced by about one-half; or, the height increasing in arithmetical, the density diminishes in geometrical progression. Its total weight is about 15 pounds for every square inch of the earth's surface, at or near the level of the sea. This pressure would counterpoise a column of water 34 feet high, as shown in the sucking pump; or a column of mercury 30 inches high, as shown in the barometer.

In the *sucking pump*, as the piston rises and removes the air from within, the pressure of the air on the external water forces it into, and up the pump, till it is in equilibrium. Then, when the piston descends, the fixed *valve*, below, closes, and prevents the descent of the water; which is therefore forced upwards through the valve of the piston. In the *lifting*, and *forcing pumps*, the valve of the piston opening in one direction, allows the fluid to pass, and then, by the opposite motion of the piston, forces it onward, without allowing it to return. The *air pump*, is a forcing pump, with tight pistons and valves, for exhausting the air from any attached vessel. The *barometer*, consists of a glass tube, more than 30 inches long, open at one end, which dips into a cup of mercury exposed to atmospheric pressure. The mercury with which the tube was at first entirely filled, descends in it, leaving a vacuum above, but still remains about 30 inches higher than that in the cup; varying with the change of pressure of the air. Its use, in calculating heights, depends on the falling of the mercury, about $\frac{1}{10}$ of an inch for every 90 feet in height that we ascend.

The atmosphere would rush into a *vacuum*, at the level of the sea, with a velocity of about 1330 feet per second. The *resistance* of the air to bodies moving through it, increases with the square of the velocity; as in the case of liquids; so that by doubling the velocity the resistance is increased fourfold. Hence, vessels moving swiftly, are propelled at a great sacrifice of force. *Sound*, is caused by vibrations of the air, produced by sounding bodies: but though the sound moves onward to a great distance, each particle of the air only vibrates through a very small space, towards and from the source of sound. The rapidity of these vibrations, determines the note, or *tone;* as will be explained in treating of Music. The vibrations are propagated successively, and continuously, like waves from a pebble thrown into still water: and hence we say that sound *moves* at the rate of about 1130 feet per second, in the air; and nearly ten times as fast, along cast iron.

CHAPTER II.

ASTRONOMY.

Astronomy is that branch of Acrophysics, or Natural Philosophy, which treats of the heavenly bodies; and their relation to the earth, regarded as a part of the planetary system. The name is derived from the Greek, αστρον, a star, and νομος, a law; literally signifying the laws of the stars. The most prominent heavenly bodies, compose a central group; central at least so far as the universe is known to us, and called the *solar system;* at an immense distance from which are the *fixed stars;* the nearest of them being at least 200,000 times as far from us as we are from the sun. The solar system, consists of the *sun*, placed at its centre; the *planets*, of which the earth is one, revolving around it in nearly circular orbits; the *satellites*, revolving around the planets; and, lastly, the *comets*, which also revolve around the sun, but in very eccentric orbits. Could we fly at the rate of 100 miles an hour, the speed of the tempest, we should require more than twenty million years to reach the nearest fixed star: and our sun would then appear to be a mere star itself; while the whole solar system would, if visible, seem to occupy less space than the evening star does to us.

The study of Astronomy, properly comprehends an investigation of the shape and dimensions of the earth. This has been found, by measuring, in various places, a degree of the meridian; from which the circumference of the earth, being 360°, may be readily calculated; and from this we obtain its diameter. The diameter of the earth, thus found, becomes a basis, from which the distance to the sun is ascertained, by ascertaining the angular difference of direction in which that luminary would appear, to observers on opposite sides of the earth. In like manner, the distance from the earth to the sun being known, becomes a basis, by which the distance of the fixed stars is found to exceed a certain limit; although so great that it cannot be exactly measured. The uses of Astronomy, are as important, as its discoveries have been surprizing: and both have prompted its votaries to new and persevering researches. It is especially in its services to Navigation, that Astronomy has aided in extending the progress of discovery; encouraging commercial enterprize, and diffusing the lights of civilization and Christianity around the habitable globe.

Astronomy is a science doubtless of the highest antiquity. Josephus speaks of a period of 600 years, called the *grand year*, as being known to the Antediluvians, according to the Jewish tradition: and it is certain that the Egyptians and Chaldeans paid great attention to the stars, in connection with their favorite study of *astrology*, or divination by means of celestial phenomena. Ancient writers state that when Babylon was taken by Alexander the Great, astronomical records were found there, extending back 1903 years, or to the year 2234 B. C.: but the earliest eclipses authentically recorded, are those observed at Babylon, 720 and 718 B. C. The origin of Astronomy has also been attributed to the Indians, and Chinese; but we think without sufficient proof. The *Sothic period*, of the Egyptians, was one of 1460 years, in which their months returned to the same day of the year; and the *Saros*, of the Chaldeans, corresponded to the Metonic or lunar cycle. (p. 200).

The Greeks derived some knowledge of Astronomy from Egyptian, and perhaps Phœnician colonies; but Thales was the first among them who observed the solstices, and calculated eclipses. Anaximander discovered the sphericity of the earth; and Pythagoras first taught the true doctrine of the Solar system: but he confined this knowledge to his disciples; and it does not appear to have prevailed, at any time, among the ancients. Meton discovered the *Metonic* or *lunar cycle*, of nearly 19 years; at the end of which the sun and moon return to nearly the same position, in relation to the earth. Eratosthenes first measured an arc of the meridian, and deduced the circumference of the earth: and to Hipparchus we are indebted for the earliest catalogue of the stars; and for the invention of latitude and longitude, to define their position. Ptolemy retarded the science of Astronomy, by maintaining that the earth is at rest, and that the sun and planets revolve around it, as a centre; but his

Almagest, (p. 161), famous from the Arabic translation of it, was in other respects a valuable compendium of this science.

On the revival of science, in modern Europe, Alfonso, king of Castile, in the year 1252, corrected the astronomical tables of Ptolemy, and caused those to be published which have since borne his own name. Copernicus, of Thorn, next revived the true solar system, about 1530 ; and he shares with Pythagoras the honor of giving it his name. It was opposed by Tycho Brahe ; and in part by Longomontanus ; but their systems have been long since rejected. The *Tychonic* system agreed with the Ptolemaic in supposing the earth to be stationary, and the sun and moon to revolve around it ; but it differed in regard to the planets, which it supposed to revolve primarily around the sun. Kepler first analyzed the motions of the planets, and discovered those laws on which rests the theory of universal gravitation. Galileo advocated the Copernican system ; and by the aid of one of the first telescopes, discovered Jupiter's satellites. Huyghens discovered Saturn's ring, and fourth satellite ; and four others were soon after noticed by Cassini.

Newton, in 1686, published his *Principia*, explaining the theory of universal gravitation, and thereby establishing the Copernican system on an immovable basis. This theory has been farther developed, particularly by Euler, D'Alembert, and La Place. Dr. Bradley discovered the aberration of the fixed stars ; of which catalogues have been made by Bayer, Flamstead, Halley, and Herschel : but the best are those of Lacaille, Bradley, Mayer, and Maskelyne. The transits of Mercury in 1631, and of Venus, in 1639, were predicted by Kepler : Gassendi observed the former, and Horrox, the latter. To Halley, who predicted it, and Maskelyne, who observed it, we are most indebted for the application of the transit of Venus, in 1761, to discover the true distance of the sun ; which was farther corrected by that of 1769. Dr. Herschel discovered the planet Uranus, in 1781 ; and its satellites, in 1822. Ceres was discovered by Piazzi, in 1801 ; Pallas, by Dr. Olbers, in 1802 ; Juno, by Harding, in 1804 ; and Vesta, by Dr. Olbers, in 1807. Thus far, only have we room to speak of the history of Astronomy.

We proceed now to give some ideas of this science, under the four divisions of Descriptive, Siderial, Physical, and Practical Astronomy.

§ 1. Under the head of *Descriptive Astronomy*, we would include the study of the magnitudes, distances, motions, and phenomena, of the bodies which compose the Solar System. The *sun*, which we have already mentioned as placed at the centre of this system, is a globe, 885,000 miles in diameter ; which turns on its axis once in 25 days, as ascertained by the spots on its surface. The *planets*, of which the earth is one, revolve around the sun in *orbits*, which are *ellipses*, having the sun in one of their foci. The point at which a planet is nearest the sun, is called its *perihelion ;* and the opposite or farthest point of each orbit is called the *aphelion*. These points, in connection, are called the *apsides ;* and the line joining them is the line of the apsides. The orbits of the other planets are slightly inclined to that of the earth ; and cut its plane, each in two opposite points, which are called the *nodes :* that one at which the planet passes to the north side of the earth's orbit being called its *ascending node.* The apsides gradually advance, but the nodes retrograde; and thus the direction in which these points appear, is changed, as seen from the sun, and referred to the fixed stars or celestial sphere.

The *earth*, is an oblate sphere, 7899 miles in polar, and 7925 miles in equatorial diameter: its mean distance from the sun being 95,000,000 miles. The principal circles of the earth, we have already defined, in the introduction to Geography; (p. 162); and we there mentioned that the earth's diurnal rotation causes the alternation of days and nights; while the parallelism of its axis, which makes an angle of 66½° with the plane of its orbit, but points continually towards the north star in the heavens, and hence sometimes inclines the north pole towards the sun, and sometimes from it, varies the length of the days and nights, and causes the changes of the seasons. The exact length of the *tropical* or *equinoctial year*, is 365 days, 5 hours, 48 minutes, and 48 seconds. The *moon*, is a satellite, or secondary planet, 2160 miles in diameter, and 237,500 miles from the earth; around which it revolves, while carried, with the earth, around the sun. It performs a *lunation*, or *synodic revolution*, that is from new moon to new moon again, in 29 days, 12 hours, 44 minutes, and 3 seconds. When near either of its nodes, at new moon, its shadow falls upon the earth, and causes a *solar eclipse*, or eclipse of the sun; and in the like case at full moon, it passes into the earth's shadow, and causes a *lunar eclipse*, or eclipse of the moon.

Mercury and Venus are called *inferior planets*, because they are nearer to the sun than the earth is; but the other planets are called superior. Their principal data are given in the following table.

PLANETS.	Diameter in miles.	Distance from the sun.	Annual Revolution.	Diurnal Rotation.
Mercury	3,000	36,800,000	3 months	
Venus	7,600	68,700,000	7 months	23⅓ hours
The Earth	7,912	95,000,000	1 year	24 hours
Mars	4,200	145,000,000	2 years	24⅔ hours
Vesta	250 ?	225,200,000	3⅔ years	*unknown.*
Juno	1,400 ?	253,800,000	4⅓ years	
Ceres	1,200 ?	263,000,000	4⅔ years	
Pallas	2,000 ?	264,000,000	4⅔ years	
Jupiter	89,100	494,000,000	12 years	10 hours
Saturn	79,000	907,000,000	29½ years	10¼ hours
Uranus	35,000	1,824,000,000	84 years	

The planets Vesta, Juno, Ceres, and Pallas, sometimes called *asteroids*, may more properly be termed intercalary planets; from their filling a supposed chasm in the series. Their size is somewhat uncertain. Jupiter has four *satellites;* Saturn, seven; and Uranus, formerly called Herschel, has six. The extreme diameter of Saturn's *ring* is 176,000 miles. The brightest planets, are Venus, and Jupiter; and next to these are Mars and Saturn; Mars being recognizable by its red color. Of the *Comets*, usually distinguished by their bright train, *Halley's* returns once in about 75½ years; *Encke's*, once in about 3⅓; and *Biela's*, once in about 6¾ years.

§ 2. Under the head of *Siderial Astronomy*, we include the study of the Fixed Stars; or those luminaries which maintain continually nearly the same relative position in the heavens. These stars are supposed to be the suns of other systems; each having planets revolving around it, which latter, from their fainter reflected light, are to us invisible. Of the immense distance of the fixed stars, we have already spoken, in introducing the present branch. They are classed according to their apparent magnitudes: those of the first magnitude appearing the largest, and those of the sixth magnitude being the smallest, which are visible to the naked eye: but the telescopic stars are also classed, down to the sixteenth magnitude. These magnitudes depend not only on their actual size, but on their distance from the earth, which is doubtless very different for different stars. Some of them are *variable;* regularly increasing and decreasing in brightness; and some of them are double or *binary stars*, one of which is, in many instances, found to revolve around the other. There are also *nebulæ;* of which the *galaxy* or milky way is an assemblage; and which are shown, by the telescope, to consist of almost innumerable small or very distant stars.

The position of the fixed stars, is defined, either by their *right ascension* and *declination*, which correspond to longitude and latitude on the earth; or by their celestial *latitude* and *longitude*, which are essentially different. As the plane of the earth's equator, prolonged to the heavens, forms the *celestial equator*, so the plane of the earth's orbit, extended to the heavens, defines the *ecliptic;* a circle which is very nearly stationary among the fixed stars. The *vernal equinox*, or point at which the sun, appearing always in the ecliptic, crosses the equator, in going to the north, is the origin of both right ascension and celestial longitude, or the point from which they are both reckoned; the former on the equator, but the latter on the ecliptic. And as terrestrial latitude is distance, in degrees, north or south of the equator, so is celestial latitude distance north or south of the ecliptic. Circles of *declination*, are perpendicular to the equator, and correspond to terrestrial meridians; but circles of *latitude*, are perpendicular to the ecliptic, and meet at its poles. Parallels of *declination*, are parallel to the equator; but parallels of celestial *latitude*, are small circles parallel to the ecliptic.

In order to designate the fixed stars, they have been grouped into clusters, or *constellations*, which are now 128 in number; occupying the whole celestial sphere. The brightest star in any constellation is named *alpha*, (α), as α *Arietis;* the next brightest is named *beta;* and so on, until the Greek alphabet is exhausted; when recourse is had to the Roman alphabet; and after this, to numbers. The twelve constellations of the *zodiac*, in which the planets generally appear, are, *Aries*, the ram; *Taurus*, the bull; *Gemini*, the twins; *Cancer*, the crab; *Leo*, the lion; *Virgo*, the virgin; *Libra*, the balance; *Scorpio*, the scorpion; *Sagittarius*, the archer; *Capricornus*, the goat; *Aquarius*, the waterer; and *Pisces*, the fishes. Among the other most remarkable constellations, are *Orion*, known by three bright stars in its belt, nearly on the equator; *Ursa Major*, or the great bear, in which lies the cluster called the *dipper*, two stars of which, called the *pointers*, point to the pole star; and *Cassiopeia*, which lies on the opposite side of the pole from the great bear, and contains the figure of a smaller dipper, by the position of which the pole star may also be found.*

§ 3. It belongs to *Physical Astronomy*, to investigate the causes of the celestial phenomena, which Descriptive and Practical Astronomy make known. The key to this subject is the law of universal gravitation, discovered by Newton. The planets *gravitate* towards the sun, and towards each other; that is, they are attracted, directly as their masses, and inversely as the squares of their distances. Hence, they would all fall together, and meet in their common centre of gravity, did not their motion in their orbits give them a tendency to recede from the centre, like a stone from a sling, in a line tangent to the curve which they are describing. This tendency, called their *centrifugal force*, and their mutual attraction, called their *centripetal force*, especially that of the sun, counterbalance each other, and cause the planets to move according to Kepler's three laws; which were the basis of Newton's discovery. 1. The planets describe ellipses, having the sun in one of their foci; 2. Their *radius vectors*, or lines drawn from them to the sun, pass over equal areas in equal times; and 3. The squares of their times of annual revolution are proportional to the cubes of their mean distances from the sun.

By the second law, the planets move slowest when farthest from the sun; as the radius vector, being then the longest, describes an equal area by a smaller angular motion. The mutual attractions of the planets cause slight irregularities in their orbits, called *perturbations:* and it is the common centre of gravity of the earth and moon, which describes an elliptic orbit around the sun; the earth's centre deviating slightly from this ellipse, during its annual revolution. When the moon is at or near the *syzigies*, that is the new or full, the sun's attraction, tending to separate the earth and moon, causes the inequality called the *evection*, affecting the shape of the orbit; and when the moon is about 45° from the syzigies, the sun's attraction affecting its angular velocity, causes the inequality called the moon's *variation*.

§ 4. Under *Practical Astronomy*, is included the use of instruments in making celestial observations, and the use of tables and formulas in deducing results therefrom. The most important astronomical instruments, are the *Transit Instrument*, and the *Astronomical Clock:* but even these, we have no room to describe. The *altitude* of a heavenly body, is its angle of elevation above the horizon: and the *azimuth*, is the angle between a vertical circle passing through the body, and the vertical plane of the *meridian;* which latter cuts

* On the fifth day of August annually, at 9 o'clock in the evening, the central star of the dipper, (δ Ursæ Majoris), will be on the west side of the pole; and the second brightest star, (β Cassiopeiæ), will be on the east side of it, and at nearly the same altitude; both of these stars being nearly in the equinoctial colure. At the same time, the pole of the ecliptic will be directly above the pole of the heavens, as shown in Plate VIII. On the fifth of February, at the same hour in the evening, Cassiopeia will be to the west, and Ursa Major to the east, of the pole; as represented by turning the plate halfway around: and Orion will then be a little to the west of the meridian.

the north and south points of the horizon. The direction of a heavenly body, is defined by means of its azimuth, and its altitude, or *zenith distance;* which latter is the complement of its altitude. This direction is affected by atmospheric *refraction*, which makes objects appear higher than they really are; and by *parallax*, which is the variation that would be produced in the direction, were the object seen from the earth's centre. The refraction is greatest at the horizon, being there nearly half a degree, and it diminishes from thence to the *zenith*, or point directly overhead, where it is zero, or no refraction takes place.

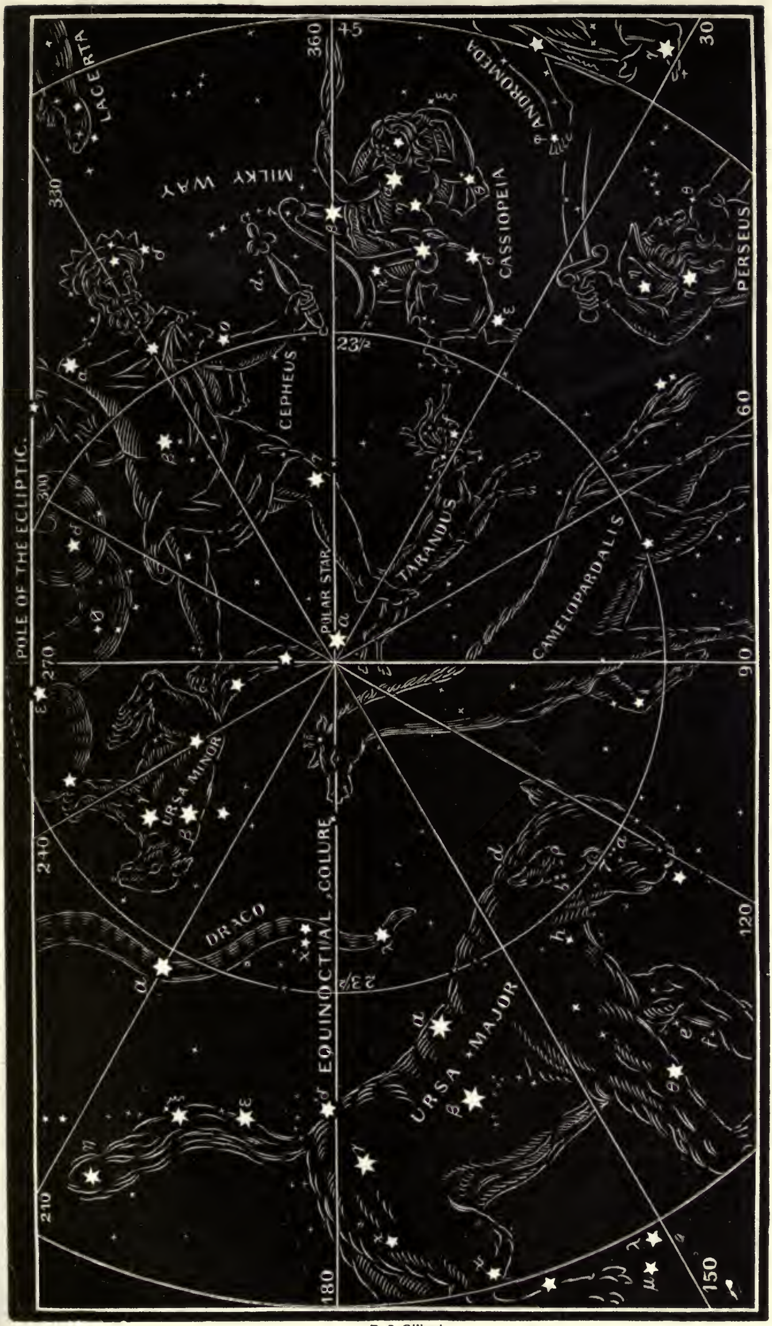
The Transit instrument is generally so placed, that the axis of its telescope shall rotate in the plane of the meridian; which may be found by observing the same star when at equal altitudes, before and after passing the meridian, and bisecting the angle formed by these two positions. We may then find the altitude of the *pole*, that is, of the point where the earth's axis, prolonged, meets the celestial sphere, by observing the meridian altitudes of a star which is near the pole, both when above and below it, and bisecting the difference, after correcting it for refraction. The altitude of the pole is equal to the *latitude* of the place; and the *longitude* may be found by means of a chronometer; which is a very accurate timepiece; or by observing an eclipse of one of Jupiter's satellites at that place, and comparing the time with that of the same eclipse at Greenwich; if the longitude from Greenwich be sought. The difference of time, will give the difference of longitude; allowing 15° for each hour. The sun appears to move eastward among the fixed stars; but this must be caused by the real motion of the earth around the sun; for in no other way can all the celestial phenomena be reconciled and explained.

CHAPTER III.

OPTICS.

Optics, is that branch of Acrophysics, or Natural Philosophy, which treats of the nature and properties of light, and the phenomena of vision. The name is derived from the Greek, οπτομαι, I see. *Light*, is an emanation, or something proceeding from bodies; which, reaching the eye, makes a peculiar impression, as sound does upon the ear; an impression to which the other organs of the human body are insensible. Light is found to move generally in straight lines; and with a velocity of 192,500 miles per second; or from the sun to the earth in about 8 minutes. A *ray* of light, is comprehended in a single line proceeding from any luminous point; and an assemblage of rays forms a *beam*, or *pencil*, of light. When light impinges on any body, it is either reflected from it, or transmitted through it, or absorbed within it; and these effects are frequently produced conjointly. These facts give rise to the old divisions of *Catoptrics*, treating of reflected light, and *Dioptrics*, treating of transmitted light; which, however, do not exhaust the subject.

PLATE VIII. ASTRONOMY.



R. S. Gilbert.

Concerning the nature, or essence, of light, two different theories have long been maintained. The *emissive theory*, supposes light to consist of material, though imperceptibly small particles, or *atoms*, thrown off from the luminous body, and diverging in all directions. This theory was maintained, in ancient times, by Pythagoras; and was adopted by Newton. The *undulatory theory*, supposes light to be caused by a peculiar fluid, or ethereal *medium*, diffused throughout all nature; in which vibrations are produced by luminous bodies, like those in the air by sounding bodies; only, far more rapid, and sensible only to the eye. This theory was proposed by Huyghens; and was advocated by Euler, and Young. Either of these theories may serve to explain most of the facts, and assist in remembering them: but the preference is now more generally given to the latter. The study of Optics, has served not only to aid the sight, by the invention of various instruments; but also to explain many phenomena of nature, which were previously unknown, or involved in mystery, or applied to purposes of deception and crime.

The history of Optics, commences, perhaps, with the mention of brazen *looking glasses*, in the books of Exodus and Job, as in use among the ancient Hebrews; and of *burning lenses*, of glass or crystal, as known in Greece, about 450 B. C. Archimedes is said to have set fire to the Roman fleet attacking Syracuse, by means of an assemblage of glass mirrors. The earliest systematic writer on Optics, was Euclid, the geometer; who adopted the notion of Empedocles and Plato, that light proceeds originally from the eye, and is then reflected back from luminous objects. The prismatic *spectrum*, was known to Seneca; but his explanation of it was imperfect. Ptolemy first gave a table of *refractions*, in his work on Optics, and applied it to the correction of astronomical observations. Alhazen, the Arabian, who wrote about A. D. 1100, disproved the Platonic notion of *ocular beams;* and adopted the emissive theory.

Roger Bacon, the English monk, first discovered the principle of microscopes and telescopes, and probably invented *spectacles;* which were first used about 1275, during his life time. The invention of the *camera obscura*, by Porta of Naples, about 1460, led Kepler to discover the true mechanism of the eye. The invention of the *telescope*, is attributed, by Descartes, to Metius of Holland, about 1600; and by others, to Jansen, or Johnson, of Zealand, about the same date: but the English claim the invention for Leonard Digges, as early as 1591. Galileo, having heard of this instrument, invented, in 1609, the telescope which bears his name. The astronomical telescope, was suggested, or revived, by Kepler, and made by Scheiner, about the year 1650: the reflecting telescope was first constructed by James Gregory, in 1663; the Newtonian, was invented in 1666; and the Cassegrainian, in 1672. The invention of the simple *microscope*, has been attributed to Drebbell, of Holland, about 1618; but we think more justly to Jansen, about 1610. The compound refracting microscope, was invented by Fontana of Naples, in 1618. The magic lantern was invented by Kircher, who died in 1680.

In 1611, Antonio de Dominis, archbishop of Spalatro first illustrated experimentally the cause of the rainbow; the complete theory of which was afterwards given by Descartes. The law of refraction was discovered by Snell, of Leyden, in 1621; and Bartholin, of Denmark, first noticed the phenomenon of double refraction about 1669: to which Huyghens added, that the light thus refracted, was polarized at the same time. Grimaldi first noticed the diffraction of light, in 1665: and Newton, in 1675, studied the formation of colored rings, and fringes, by means of thin plates. In 1672, Newton announced to the Royal Society his new theory of light; and its application to the prismatic spectrum. The invention of achromatic telescopes, belongs to Mr. Hall, of England, as early as 1733; though first patented and made public by Mr. Dollond, in 1757. In 1800–8 Dr. Young applied the undulatory theory to the general explanation of colors; and in 1810, Malus, of France, discovered the polarization of light by reflection. Dr. Wollaston invented the camera lucida, in 1807. The more recent discoveries made by Biot, Brewster, and others, we have no room to describe.

We proceed to give some ideas of this science, under the heads of Catoptrics, Dioptrics, Physical Optics, and Practical Optics; as the more common division of the subject.

§ 1. *Catoptrics*, so named from κατοπτρον, a mirror, treats of the reflection of light from smooth or polished surfaces. This reflection takes place according to the same law as in the case of sound, or of elastic bodies. The *incident* ray, and the *reflected* ray resulting from it, both lie in the same plane, perpendicular to the reflecting surface; and the angles which they form respectively with a line perpendicular to the surface, that is, the angles of *incidence* and of *reflection*, are always equal. A polished metallic reflector, is called a *speculum;* and a glass reflector is usually called a *mirror:* but, in the latter, the light is chiefly reflected from the silvering, or metallic surface on the back, to which the glass gives shape and smoothness. Reflectors are generally either *plane*, or *concave*, or *convex;* the two latter with spherical surfaces, and taking their name from the side which reflects the light. In plane reflectors, the rays make the same angle with each other, after, as before their reflection.

From a *concave reflector*, parallel rays are reflected, converging, to a point called the *principal focus;* at which the heat and light are concentrated. Rays which previously converged, are reflected by a concave surface still more converging: but rays which diverged, before impinging, will be reflected either less diverging, or parallel, or converging, according to the distance of the *radiant point* from which they emanated. If the luminous object be more distant from the concave surface than the centre of curvature of the latter, then an inverted and reduced *image* of the object will be formed, between the centre of curvature and the principal focus: but if the radiant object be brought between these two points, it will produce an inverted and magnified image, farther off than the centre of curvature. This latter, is the precise arrangement of the *reflecting microscope;* and the former case, where the luminous object is very distant, is the principle of the *reflecting telescope.* As the concave reflector always renders the rays more converging, or less diverging, than previously; so the *convex reflector* renders them more divergent, or less convergent, than they were before reflection; and hence forms reduced images of objects, apparently behind the mirror.

§ 2. *Dioptrics*, from διοπτρα, a perspective instrument, relates to the phenomena of light transmitted through transparent bodies. When a ray of light impinges obliquely on a transparent body, that part which passes through it, is *refracted*, or bent from its previous course, both on entering and on leaving the body. Thus, if we look at any object at the bottom of an empty vessel, and watch it while water is poured into the vessel, the object will seem to rise. If the transparent medium be of uniform density, the ray, while in it, will move in a straight line: but if the density vary, the ray will describe a curve, as in the atmosphere, where the rays of light are bent downward. The angle formed by the refracted ray with the perpendicular to the surface, is called the *angle of refraction:* and, for the same media, the sines of the angles of incidence and of refraction have a constant ratio, whatever be the obliquity. This ratio, called the *index of refraction*, is, at the common surface of air and water, 1.336; and for air and glass it is about 1.5; varying with the composition of the glass employed.

These facts apply immediately to *lenses;* which are, usually, circular pieces of glass, having one at least of the two opposite surfaces spherical. The *double convex*, *plano-convex*, and *meniscus* lenses, are thickest in the middle, and have a converging effect on the rays which pass through them; while the *double concave*, *plano-concave*, and *concavo-convex* lenses are thinnest in the middle, and tend to make the rays which pass through them divergent. The focus of parallel rays passing through a converging lens, is called the *principal focus;* but as the radiant point, or object, draws nearer, the focus is carried farther off, and, beyond a certain distance, the image is magnified. This is the leading principle of the *compound refracting microscope.* If an object be brought too near to the eye, the rays from each point diverge too much for distinct vision; but a converging lens interposed enables the object to be seen distinctly when much nearer, and thus makes it appear larger. This is the principle of the *simple refracting microscope*, and of all convex eye-glasses. In the *refracting telescope*, an image of the distant object is formed by the rays passing through the object glass; and this image is seen magnified, through the eye-glass, placed very near it. Objects seen through a concave, or diverging lens, appear nearer and smaller than they really are.

§ 3. *Physical Optics*, is that branch of this science, which treats of the physical properties of light, and the means by which they have been investigated. Light may be decomposed, either by refraction, absorption, or reflection. If a ray of light be made to pass through two faces of a triangular glass prism, it will not only be *refracted*, or turned away from the vertex of the angle formed by those two faces, but it will be *decomposed* into rays of seven distinct colours; *red*, orange, *yellow*, green, *blue*, indigo, and violet: and if these colours be received on a screen, or card, they will form what is called the *prismatic spectrum.* Red, yellow, and blue, are generally regarded as primary colours; but orange is a compound of the two former; green of the two latter; and indigo and violet are compounds of the two extreme colours, red and blue. The violet rays will deviate most from their original direction; as they are the most refracted.

Hence, when a beam of light falls on a simple converging lens, it is not only somewhat scattered at the focus, by the refraction of the spherical surfaces, producing what is called *spherical aberration;* but the different colours, being unequally refracted, form an image with colored rings: and this effect, called *chromatic aberration,* long presented the greatest difficulty in forming perfect refracting telescopes. It was remedied by the discovery that flint glass, containing lead, forms a longer spectrum than crown glass, for the same deviation; or, in other words, has a greater *dispersive power.* Hence, by combining a convex lens of crown glass, with a weaker concave one of flint glass, the latter may counteract the dispersion of the former, without entirely counteracting its refraction; and this constitutes an *achromatic lens*, such as is used for the object glass of the best telescopes.

Light may be decomposed by *absorption;* as when it meets a blue glass; which absorbs the other colors, and chiefly transmits and reflects the blue. In this way it may be shown, that most of the colors are compounded; black being the absence of light; and white, a combination, or interpolation of all the colours; which are supposed to be caused by the more or less rapid undulations, or vibrations of the ethereal medium. Thus, green glass, or the green leaves of plants present this color, it is supposed, because they reduce the vibrations of the ethereal medium to a certain length or rapidity: these being shortest for the violet, and longest for the red, of all the colors. The formation of colored rings, by thin plates, as in soap bubbles; or, by *diffraction,* as around the shadows of small bodies held in a cone of diverging light; or, by *diflection,* as in the light reflected from a thick concave mirror; and the colored fringes seen on fibrous, or finely grooved surfaces, are all attributed to the interference of undulations proceeding from different points, and more or less counteracting each other. Of the double refraction and polarization of light, we have no room here to speak.

§ 4. *Practical Optics*, properly includes the application of optical principles to the explanation of natural phenomena, and the construction of optical instruments. The *rainbow*, is formed by rays of light, from the sun or moon, striking drops of water, being refracted in entering them, reflected back, in part, from the opposite side of the drops, and refracted again on leaving them, so as to produce prismatic colors, some of which meet the eye. In the inner, or primary bow, the light is refracted downwards, and undergoes but one reflection: while in the outer, or secondary bow, the light striking the lower side of the drop, is first refracted upwards, and reflected twice within the drop, before leaving it: hence, its light is fainter. Solar and lunar *halos*, or circles of light; and *parhelia*, and *paraselenæ*, or mock suns and moons, are supposed to be caused by the refraction of light through crystals of ice, floating in the air.

We must not omit to notice the mechanism of vision. The outer coating of the eye is transparent in front; and this part is called the *cornea:* while the *sclerotica*, which covers the rest of the eye, is opaque and white, but lined with the *choroid coat* and a black pigment; within which, is the *retina*, a nervous coating, connected with the brain. The *iris*, is a dark screen, behind the cornea; from which the eye takes its colour: and the *pupil*, is a circular aperture, or window, through the iris, by which light is admitted to the dark chamber within. In this chamber is the *crystalline lens*, held in its place by the ciliary processes; with the *aqueous humor* in front of it, and the *vitreous humor* in the back part of the eye. All the rays coming from any one point of a luminous object, and entering the pupil, are refracted, by the interior media, to one point or focus on the retina, by means of which the luminous point is perceived. The same principle applies to the *camera obscura;* in which all the rays from any one external point, are reflected and refracted, so as to form one point of the image or picture within. In the *magic lantern*, the image formed by refraction, is enlarged, and received on a screen, which corresponds to the retina of the eye. Of telescopes and microscopes, referred to in the preceding divisions, we have no farther room to speak in this brief synopsis.

CHAPTER IV.

CERAUNICS.

We would propose the name of Ceraunics, for that branch of Natural Philosophy, which relates to the effects of heat and electricity; commonly associated in nature, and together forming one great division of science.* The name is from the Greek, κεραυνος, lightning; a phenomenon in which the union of heat and electricity is peculiarly manifested; and the study of which involves that of nearly all the sub-branches here included; that is to say Calorics, Electricity, Galvanism, Magnetism, Electro-Magnetism, Thermo-Electricity, and Meteorology. The order in which these branches are here named, is that in which we think they may best be understood: as those first named, can be studied independently; but the others, only by their aid. They all belong strictly to Experimental Philosophy; and they have already contributed largely to the comfort of mankind, by their applications to the Physical Arts: but some of these sciences are still in comparative infancy, and open a wide field for new researches.

Following our general order, the history of these sciences will first engage our attention. The study of *Calorics*, as a connected science, is of modern origin. Lord Bacon conceived heat to depend upon a vibration of the particles of matter, tending to separate them; an idea

* Should it appear hereafter, as may be the case, that heat consists in undulations of an ethereal medium, like those of light; it will then be proper to remove Calorics from this branch, and associate it with Optics; with which it has close relations, already recognized.

which was sanctioned by Boyle and Newton. The other doctrine, that heat is produced by a peculiar subtile fluid, was maintained by Boerhaave, and is, we believe, the one more generally adopted, in explaining the phenomena. The first invention of the Thermometer, is by some writers ascribed to Drebbel of Holland; but more generally to Sanctorio of Italy, about the year 1626. The temperature was at first measured by the expansion of air; and afterwards by that of alcohol; till in 1720, Fahrenheit, of Dantzic, proposed the use of mercury, and introduced the graduation which bears his name. Wedgewood's Pyrometer was invented in 1731: and the use of concave mirrors for reflecting heat, appears to have been discovered by Lambert of Germany, in 1758. The discovery of latent heat, was made by Dr. Black of Edinburgh, in 1757; and radiant heat was first identified by Scheele, about 1770. We have only room to add that the invention of the galvanic battery, by Cruikshank, and of the compound blowpipe, by Dr. Hare, have furnished the most powerful means of producing heat yet discovered.

The knowledge of *Electricity*, possessed by the ancients, was simply the fact, known to Thales, that *amber*, when rubbed, acquired the power of attracting light bodies. In the year 1600, Dr. Gilbert announced his discovery of several other electrics; and first suggested the idea of an electric fluid, or *effluvium*. Otho Guericke, about 1650, constructed the first electric machine, by mounting a globe of sulphur; with which he produced electric light, and sound. In 1733, Dufaye discovered that two electrics, when rubbed together, become oppositely excited; on which fact he founded his theory of two fluids; the one collecting on glass, which he called *vitreous;* the other on sealing wax, or rosin, hence called *resinous* electricity. Dr. Franklin proposed the theory of one fluid, which, when accumulated, constitutes the vitreous or *positive* state; but when abstracted or deficient, causes the resinous or *negative* state, or excitement. In 1746, the Leyden jar was discovered by Cuneus and Muschenbroek; and in 1752, Dr. Franklin made his great discovery that the electric fluid is the cause of lightning. The later electric discoveries, belong chiefly to Galvanism; under which they will be mentioned, in connection with their theoretical relations. Those of Professor Faraday, and of our countryman, Professor Henry, concerning electric induction and electro-motion, are brilliant, but transcend our present limits.

The attraction of the *Magnet*, or loadstone, for iron filings, was known to Thales; but its property of pointing to the poles of the earth, though said to have been known to the Chinese, 1120 B. C., appears to have been first known in Europe, to the French; who availed themselves of it, in Navigation, about A. D. 1150: and the Mariner's compass was improved, rather than invented, by Flavio Gioia, in 1302. The variation of the compass, was first noticed by Columbus, in 1492: and the dip, was first made known by Robert Norman, in 1581. Dr. Gilbert explained the polarity of the needle by considering the earth as a large magnet attracting it; and Æpinus proposed a magnetic theory similar to the electric theory of Dr. Franklin. Dr. Knight invented the mode of magnetizing by single touch, in 1745; and Mr. Mitchell's mode, by double touch, was made public in 1750. The science of *Electro-Magnetism*, originated in 1820; when Oersted of Copenhagen discovered the peculiar action of a galvanic current on a magnetic needle. The initial discovery in *Thermo-Electricity*, was made by Dr. Seebeck, in 1822. Our history of Meteorology must be so brief that it will be deferred until we come to that science in its place.

We proceed to speak briefly of Ceraunics; taking the divisions in the order above named. (p. 361).

§ 1. The science of *Calorics*, relates to the phenomena of heat, and the laws of its action. The name is from the Latin, *calor*, heat: and the name *caloric*, has been applied to the agent which causes the sensation of heat, and which has long been regarded as a subtile, imponderable fluid, self-repellent, capable of penetrating ponderable substances, and perhaps uniting with them in definite combinations: though recent discoveries strongly favor the extension of the undulatory theory to heat, as well as to light. The sources of heat, are the sun; combustion, and other chemical action; friction, and other mechanical action; electricity and galvanism; and animal life. Caloric is conceived to exist in two different states; sensible and latent. *Sensible caloric*, is that which affects the thermometer, and produces the sensation of heat; while *latent caloric*, though supposed to be present in bodies, does not affect the thermometer or the senses; perhaps because it is, as it were, chemically combined with the ponderable substance.

Caloric is supposed to emanate from all warm bodies, either by radiation or conduction. It is said to be *radiated*, when it darts forth with great velocity, like light: and it is said to be *conducted*, when it passes slowly from particle to particle of the surrounding bodies. Caloric radiates best from dark and rough surfaces; and is best conducted by the metals; more slowly by wood and earths; and in liquids it is carried upwards chiefly by circulation. Radiated caloric, meeting any substance, is, like light, either *reflected*, absorbed, or transmitted; and in the latter case refracted, as in the solar prismatic spectrum. It is best reflected from bright and polished surfaces; and absorbed by dark and rough ones. The *cooling* of bodies is, of course, attributed to the abstraction of caloric, from their giving out more than they receive. The *effects* of caloric, are the *expansion* of nearly all bodies, except melting ice, or antimony, and heated clay; the *liquefaction* of solids, and the *vaporization* of liquids; in which cases a certain quantity of caloric is supposed to become latent, or chemically combined; and, finally, the production of light, electricity, and chemical action.

§ 2. *Electricity*, so named from ηλεκτρον, the Greek word for amber, treats of the phenomena first discovered in that substance, when subjected to friction; and ascribed to an extremely rare or subtile fluid, pervading the material world. If we rub smooth glass with a silken cloth, both substances become electrically excited; as is proved by their attracting pith balls, or other light bodies near them. This is explained, according to Dr. Franklin's theory, by supposing that the glass becomes charged with an excess of the electric fluid, that is *positively excited;* and that while this fluid repels its own particles, it attracts those of ponderable substances, as of the pith balls. The silk is supposed to be deprived of the electric fluid, that is, to become *negatively excited;* and hence to attract the pith balls which contain the electric fluid, by attracting the fluid itself. The pith balls which are attracted by the glass, become charged with the fluid, on touching the glass; and are then repelled by the self-repellent power of the fluid: but two negatively excited bodies repel each other, either because ponderable matter, when deprived of the electric fluid, is self-repellent, or because they are attracted in opposite directions by the electric fluid in the surrounding air. The electric excitement is strongest when the air is cold and dry; for moist air conducts and distributes the electric fluid.

Those substances along or through which the electric fluid passes freely, are called *conductors*, or non-electrics; as metals, charcoal, and water: but those substances which will not permit the fluid to move freely over them, are called *electrics*, or non-conductors; as glass, rosin, and silk; which latter becomes negative when rubbed with glass, but positive when rubbed with rosin or sealing wax; the resins being among the strongest negative electrics. When an excited electric is brought in contact with another in a neutral state, the latter becomes similarly excited by *conduction:* and on this principle the prime conductor of the *electric machine* collects the electric fluid from the glass plate or cylinder. This principle applies also to the interior of the *electric jar*, commonly called the *Leyden jar;* when its knob is brought near to the electric machine: but the exterior of the jar becomes oppositely charged, by *induction;* which is attributed to the electric fluid on one side, repelling that on the other. Electric excitement may also be produced by chemical action, by heat, and probably by mere contact of bodies, though in a feeble degree.

§ 3. To *Galvanism*, belongs the study of electrical currents, produced continuously, by chemical action; with their direct effects, and the mode of producing them. This science originated with Professor Galvani, of Bologna; who, in 1790, observed that if a piece of zinc, and another of silver were brought in contact, the one with a muscle, and the other with a nerve of a frog recently killed, muscular convulsions would ensue, whenever the two metals were brought, at the same time, in contact with each other. Galvani believed this effect to be produced by a peculiar animal electricity; while Volta maintained that it was owing to common electricity developed by mere contact of the metals: but Dr. Wollaston maintained that the electric excitement was produced by the chemical action of the moist animal matter on the more oxidable metal; which last is now fully proved to be the chief cause. So rapid was the progress of this new science, that in 1800, Nicholson and Carlisle applied it to the decomposition of water; and in 1807, Davy was enabled, by its means, to discover the metallic bases of the fixed alkalies.

When a plate of zinc, and another of copper, are dipped, without touching each other, into any acid solution, the zinc, by the action of the acid, is supposed to acquire an electro-positive state; which enables it to decompose water, and seize on the oxygen;

forming an oxide, and from this a salt, of zinc; in which the free electric fluid of the zinc is probably combined; while the remaining zinc attracts more of that fluid from contiguous bodies. The hydrogen of the water, being set free, probably carries with it the electric fluid of the decomposed water; and is both repelled from the zinc and attracted by the copper; to which it conveys a charge of the electric fluid. If, then, wires be attached to the two plates, and brought in contact, a *galvanic current* will pass along them, from the copper to the zinc plate; forming what is called a *simple voltaic circle.* If we have a series of cells, all containing an acid solution, the zinc plate in each cell having a metallic connection with the copper plate in the next, they will form a compound circle, or *galvanic battery:* in which, as in the former case, the wire from the last copper plate is called the *positive*, and that from the zinc end, the *negative electrode;* the ends of the wires being usually termed *poles.* If these poles be brought near to each other, provided there be at least 50 pairs of plates in action, they will produce vivid ignition, and other chemical effects: and the current may also be used to charge a Leyden jar, or to produce the other effects of common electricity.

§ 4. *Magnetism*, so named from the Greek, μαγνης, a loadstone, treats of the peculiar properties first discovered in the loadstone, or native magnet; with their applications, and the means of observing them. The *loadstone*, is a complex oxide of iron, with a small proportion of silex and alumina. On presenting it to iron filings, it attracts them; and two opposite parts of it, which collect them most abundantly, are called the *poles.* If a piece of soft iron be brought near to a magnet, it becomes magnetized by induction: the part which is nearest to the north pole of the magnet becoming a south pole, and vice versa. As dissimilar poles always attract each other, and similar poles repel each other, the preceding fact explains why the magnet attracts soft iron; and why it points in a fixed direction in regard to the earth, which really acts as a large magnet would, upon the *compass needle.* The magnetic poles of the earth do not coincide with its geographic poles; and hence arises the *variation* of the compass. As we approach either magnetic pole of the earth, the dissimilar pole of the needle is attracted downwards, and hence results the magnetic *dip.* The property by which one magnet acts upon another, is called polarity.

Soft iron, is speedily magnetized by induction; but loses its magnetism, as soon as the magnet which excited it is removed. Hard steel, on the contrary, is magnetized slowly; but retains its magnetism for a long time. The best mode of magnetizing a bar, is by placing the opposite poles of two strong magnets at the ends of it; then rubbing it from the centre towards the ends with the poles of another magnet; each end being rubbed with a pole dissimilar to that which is to be produced; which is the method of *single touch:* or else rubbing it from end to end with two dissimilar poles kept near to each other; the rubbing north pole being nearest to that end which is to become a south pole; in which consists the method by *double touch.* Pieces of soft iron, called *keepers*, or armatures, are often kept in contact with the poles of magnets, to strengthen them by inductive action.

§ 5. *Electro-Magnetism*, and *Thermo-Electricity*, are kindred branches of electric science, treating of the relations between galvanism, and magnetism and calorics. It was first discovered by Professor Oersted, in 1820, that a galvanic current has a peculiar action on a magnetic needle placed near it. Supposing the current to pass through the centre of a watch, from the face to the back, it tends to carry the north pole of any magnet around it, in the direction in which the hands of the watch move; and the south pole in the opposite direction. If the magnet, or needle, turn on a pivot, exterior to the galvanic current, it will soon come to rest, in a transverse position, as the above forces require. These facts were applied by Schweigger, to the invention of the *galvanometer;* in which, if a very feeble galvanic current circulate around a coil of insulated wire, it will be rendered manifest, by acting on a magnetic needle suspended within the coil.

In 1820, Arago discovered that a bar of steel can be magnetized by a galvanic current made to circulate around it; and hence, that a *spiral coil* of insulated wire, so long as a galvanic current is passing around it, acts as a magnet; manifesting polarity; attracting other magnets; and speedily magnetizing a steel bar placed within it. This furnishes a new mode of forming artificial magnets; and it led to Ampère's theory, that the peculiar properties of magnets are owing to galvanic currents circulating around their elementary particles. On this ground, it is now generally admitted that the earth's magnetism is produced by such currents, circulating around it, and caused by the heat of the sun. This is farther confirmed by Dr. Seebeck's *thermo-electric* discovery, that if a ring be formed of two metals, one-half of it, for example, of bismuth, and the other of copper, soldered together, then, on heating one of the junctures, a galvanic current will pass through the same, from the bismuth to the copper.

§ 6. *Meteorology*, so named from the Greek μετεωρα, meteors, relates to atmospherical phenomena; their causes, and the means of observing and foretelling them. This science, if it has now reached that dignity, engaged the attention of Aristotle, and Theophrastus; and, in more recent times, of Leslie, Dalton, and other philosophers: and it is at present the subject of profound study and careful observation. Of our own countrymen, Dr. Franklin first observed that all extensive storms, in the United States, travelled towards the northeast: and Mr. Redfield first traced their course from the southern to the northeastern states; while he ascribed them, generally, to a gyratory or whirling motion of the air. Mr. Espy, who has made extensive and important researches on this subject, ascribes their formation chiefly to the action of heat: and Dr. Hare considers electricity as an equally prominent agent in their production.

If the air be heated, at any one place, it becomes rarified, and rises, as balloons do; spreading itself out above; while currents of cooler air converge to that place below, to supply the partial vacuum. This principle explains the *trade winds*, blowing towards the equator; and the *monsoons*, of the Indian ocean. (p. 163). As the heated air rises, it becomes cooler; and the aqueous vapor which it contains, is partly or wholly condensed, thus forming a *cloud*, or *mist;* which, by the aggregation of small drops, causes *rain*, or, if it be sufficiently cold, *hail*, or *snow*. If the surface of the earth be cool enough to condense the aqueous vapor in the contiguous air, it causes the deposition of *dew*. The *dew point*, is that temperature at which the condensation commences: and as it varies with the quantity of vapor in the air, being the highest when there is the most vapor, it furnishes the best *hygrometer*, or measure of the humidity of the atmosphere. We regret the want of room to explain this subject more fully.

CHAPTER V.

CHEMISTRY.

Chemistry, is that branch of Acrophysics, which treats of the composition of all ponderable substances; their sensible properties and mutual relations; and the effects produced upon them by cohesion, affinity, light, heat, and electricity. The name is derived from the Arabic or Egyptian word *kimia;* originally applied to Alchemy, and signifying the occult science. The general properties of *ponderable substances*, or those which can be collected and weighed, including solids, liquids, and gases, have already been referred to, in the introduction to this department; and the *imponderables*, as they are often termed, have formed the subject of the two preceding branches. Of course the study of Chemistry is aided by that of light, heat, and electricity; while it not only reflects light upon them in return, but becomes itself subsidiary to the natural and medical sciences which are to follow. The applications of Chemistry, extend throughout the wide range of the physical arts, wherever it is desirable to change the state or composition of the materials employed: and hence it ranks among the most useful of the sciences.

The Greeks ascribed the invention of Chemical science to Hermes, or Mercurius Trismegistus, called by the Egyptians, Thoyt; and, in honor of him, they gave to this branch the name of the *Hermetic art*. It was brought from Egypt to Greece, about 460 B. C., by Democritus; who had learned to soften ivory, and to make glass. If we except the working of the metals, little was known of this science by the ancients; and that little was obscured, rather than enlarged, by the reveries of the earlier alchemists. *Alchemy*, appears to have been first mentioned in the writings of Maternus, about A. D. 330; and it was fully introduced into Europe by Rhazes, and Geber, Arabian chemists of the ninth century. The object of Alchemy, was to discover an imaginary substance, called the *philosopher's stone*, *elixir vitæ*, universal solvent, or grand catholicon; which would transmute all the other metals into gold, and prevent or cure all diseases. This research, though of course a failure, led to several important discoveries; as those of gunpowder, of sulphuric, nitric, and muriatic acids, and of phosphorus, antimony, and zinc.

The first collection of chemical facts, freed from the mysticism of Alchemy, was published by Barner, in 1670: but the *phlogistic theory*, suggested by Becher in 1669, and more fully developed by Stahl, first gave these facts a connected and scientific form. This theory supposed the metals, and other combustibles, to be compounds, containing *phlogiston*, or the substance of heat, which they gave out in burning. Chemistry was thenceforward rapidly advanced, by the labors of Boerhaave, Bergmann, Scheele, and others. In 1754, the discovery of *carbonic acid gas*, by Dr. Black, led to the discovery of other gases, and originated what is called Pneumatic Chemistry; forming an important era in this science. In 1778, Lavoisier proposed his *antiphlogistic theory;* that bodies when burning, instead of emitting any substance, absorb and combine with oxygen: a theory which was soon adopted by Bertholet, and proved by exact experiments.

The chemical nomenclature now in use, originated with Guyton de Morveau, about 1780; and was soon generally adopted. The idea that chemical compounds are formed of elements uniting in definite proportions, originated with Wenzel, of Saxony, in 1777, but was fully developed and generalized in 1803, by Dalton; whose *laws of combination*, proved by the labors of Wollaston, Davy, Gay Lussac, Thenard, Vauquelin, Berzelius, and others, are now regarded as the basis of this great science. The *atomic theory*, already referred to, (p. 343,) as known to the ancients, and maintained by Epicurus, was revived by Dalton, to prove these laws; and the *electro-chemical theory* of Davy, that combination takes place in consequence of the opposite electric states of the combining elements, has thrown new light on these mysterious phenomena. To Sir Humphry Davy, we are indebted, for the discovery of the metallic bases of the alkalies, in 1807: and his researches have been recently extended by our countryman, Dr. Hare. The first discovery of the vegetable alkalies was made in 1803, by Sertuerner, of Germany: since which time, the progress of this science in all its divisions has been extremely rapid; though there is still room for new investigations.

We proceed to give a brief outline of chemistry, under the heads of Non-metallic, Metallic, Organic, and Analytic Chemistry.

§ 1. Under the head of *Non-metallic Chemistry*, we would include so much of this science as relates especially to the non-metallic elements; which, for the most part, are gases, liquids, or light solids; destitute of metallic lustre; and non-conductors, or imperfect conductors of heat and electricity. There are 55 *elements*, or simple ponderable substances, now known to chemists; 42 of which are *metals*, including the newly-discovered metal Latanium; and 13 are non-metals, including Silicon. These elements, by uniting together, form *compounds*, of which the material world chiefly consists. Most of the elements are usually solid; but it is supposed that by intense heat, all the solids might be converted into liquids, and these into gases; and that by pressure and abstraction of heat, all gases and liquids might be solidified. The elements, by combination, often change their state; as when oxygen gas unites with sulphur, forming the liquid *oil of vitriol;* or with iron, to form the solid rust, or *oxide of iron.*

An *acid*, is an electro-negative compound; which, if soluble, has a sour taste; and which will combine with alkalies, or bases, to form salts. An *alkali*, or *base*, is an electro-positive compound; which, if soluble, has an acrid taste; and which will unite with acids, to form *salts:* these latter being compounds of an acid and base; and, if soluble, having what is called a saline taste. Many acids, and bases, contain oxygen; but others contain chlorine, sulphur, or other electro-negative elements, in its stead. An *oxide*, usually signifies a compound containing oxygen; and which is neither an acid nor an alkali, though it may be a base. *Potassa*, is an alkali; composed of oxygen and the metal potassium: and pearlash is a salt, composed of potassa and carbonic acid. A *chloride*, is a compound containing chlorine; and a *carburet* is one containing carbon. *Sulphuric acid* contains more oxygen than *sulphurous;* and the salts of the former are called *sulphates*, but those of the latter are termed *sulphites.* Thus, *sulphate of soda*, denotes a compound of sulphuric acid and soda; and *arsenite of copper*, is a compound of arsenious acid and the oxide of copper.

Cohesion, is the mutual attraction of *homogeneous*, or similar particles, causing the formation of solids. *Affinity* is the mutual attraction of heterogeneous particles, causing the formation of compounds. Thus, by affinity, carbon and oxygen unite, in ordinary combustion, forming carbonic acid; and this unites with lime, to form carbonate of lime: but, by cohesion, the particles of this compound are aggregated, to form solid marble. By affinity, if we add lime water to a solution of pearlash, the lime will seize on the carbonic acid; and, by cohesion, it will form a white *precipitate*, or deposite, of carbonate of lime; leaving the potassa in solution. When distinct compounds are thus formed, the elements, or constituents, are found to unite in certain definite, invariable proportions; which may be represented by what are called their equivalent numbers, or *equivalents.* Thus, 8 parts by weight of oxygen, unite with 1 of hydrogen, to form water; and with 16 of sulphur, to form hyposulphurous acid: while 1 of hydrogen unites also with 16 of sulphur to form hydrosulphuric acid. In gaseous compounds, the elements have also a very simple ratio to each other, by bulk, as well as by weight.

Of the non-metals, *Oxygen* is a colorless gas, somewhat heavier than the air, and an element of air and water, as well as of numerous other compounds. It is essential to animal life; being converted into carbonic acid when inhaled, as also by the burning of carbonaceous substances. Various other elements burn or combine with it, forming oxides, acids, alkalies, and earths. *Hydrogen*, is also a colorless gas; but 14.51 times lighter than the air: and it burns or explodes, with oxygen, forming *water;* which is an oxide of hydrogen, expressed by the formula $H+O$, or one equivalent of hydrogen to one of oxygen; as above mentioned. *Nitrogen*, is also a colorless gas, found chiefly in the *air;* which consists of 1 measure of oxygen to 4 of nitrogen; or by weight, of 8 of the former to 28 of the latter. *Nitrous acid*, ($N+4\ O$,) is distinguished by its pungent, orange colored fumes, from *nitric acid*, or aqua fortis; which consists of 14 by weight of nitrogen to 5 times 8 of oxygen; its formula being $N+5\ O$. *Ammonia*, or spirits of hartshorn, contains 14 of nitrogen, to 3 of hydrogen; expressed by $N+3\ H$.

Sulphur, is found chiefly in minerals, or volcanic effusions: and by burning, it forms sulphurous acid gas, $S+2\ O$, known by its suffocating odor. *Sulphuric acid*, or oil of vitriol, contains 16 by weight of sulphur, to 3 times 8 of oxygen, as expressed by the formula $S+3\ O$; or $\dddot{S}$. *Selenium*, is a rare element, resembling sulphur. *Carbon*, is the chief constituent of all kinds of coal; and, in burning, it forms *carbonic acid gas*, $C+2\ O$, which always exists in the air as an impurity. Coal gas, consists of various carburets of hydrogen. *Boron*, is a rare element, the basis of *boracic acid*, $B+3\ O$; found in borax. *Silicon*, is a dark brown solid, the basis of sand; which is *silicic acid*, $S+3\ O$, and which may be rendered soluble by heating it with potassa. *Phosphorus*, a soft, white inflammable solid, abounds in the bones of animals, in the state of *phosphoric acid*, $2\ P+5\ O$, but combined with lime. *Chlorine*, is a green gas, of a pungent odor, obtained from common salt; and which by uniting with hydrogen forms *muriatic*, or *hydrochloric acid*, $H+Cl$; while with oxygen it forms highly explosive gases. *Bromine*, is a red liquid, found in sea water: *Iodine*, is a black crystalline solid, found in the ashes of marine plants; and *Fluorine*, is a reddish brown gas, found in the mineral called fluorspar. All these latter elements are electro-negative, like oxygen and sulphur; and they all form acids with hydrogen; and, excepting fluorine, they form acids also with oxygen.

§ 2. Under *Metallic Chemistry*, we include the study of the metals, and their various compounds. The metals are characterized by their peculiar lustre, and their being good conductors of heat and electricity. They may be classed as the *crypto-metals*, or concealed metals, which are the bases of the alkalies and earths; and the *sapho-metals* or common metals, several of which are found native, that is, uncombined with any other elements. The metals are generally obtained from their ores; which are mostly oxides, sulphurets, or chlorides; by heating them with charcoal or combustible matter, which unites with the other elements, and sets the metal free. Of the crypto-metals, *Potassium*, is as bright as lead, but much softer, and so light that it floats on water; burning at the same time, and forming *potassa*, $K+O$, which is the caustic base of pearlash. *Sodium*, is a whiter metal, the base of *soda*, $N+O$: and common salt is the chloride of sodium. *Lithium*, is a very rare metal, the base of the remaining alkali, lithia. *Barium*, and *Strontium*, are rare metals, the bases of baryta and strontia: *Calcium*, is a white metal, the base of lime, which is an oxide of calcium; and *Magnesium*, is the base of magnesia, the remaining alkaline earth. *Aluminium*, is the base of alumina, the chief constituent of clay: and Glucinium, Yttrium, Thorium, and Zirconium, are rare metals, found in the remaining earths, technically so called.

Of the sapho-metals, or metals commonly found as such, seven were known to the ancients; to which the alchemists gave the names of the planets: calling *Gold*, Sol, or the sun; *Silver*, Luna, Diana, or the Moon; *Quicksilver*, Mercury; *Copper*, Venus; *Iron*, Mars; *Tin*, Jupiter; and *Lead*, Saturn. Of these, gold and silver are highly valuable for their rarity and durability; and mercury is the only metal which is liquid at common temperatures. *Red lead*, is an oxide of lead; *red precipitate*, is an oxide of mercury; *calomel* and *corrosive sublimate* are chlorides, and *vermilion* is a sulphuret of mercury. Eight other metals were discovered before the Lavoisierian revolution in Chemistry; namely, Antimony, Arsenic, Bismuth, Zinc, Cobalt, Nickel, Manganese, and Platinum. Of these metals, *Antimony* is brittle; *Arsenic*, volatile; *Bismuth*, heavy, and of a reddish tinge; *Zinc*, hard, and easily combustible; *Cobalt*, and *Nickel*, are rare metals, and, like iron, magnetic; *Manganese*, resembles iron, but is never used in the arts, though its black oxide is employed for obtaining oxygen; and *Platinum*, is the heaviest of all metals, hard to oxidize or melt, and hence of peculiar use in the arts. The fifteen remaining metals, more recently discovered, are rare, and of less importance. They are *Cadmium*, resembling tin; *Chromium*, forming rich colored salts; and Columbium, Molybdenum, Titanium, Tellurium, Tungsten, Vanadium, Uranium, Cerium, Latanium, Osmium, Rhodium, Palladium, and Iridium. Several of the metals, as Arsenic, Antimony, and Chromium, form acids with oxygen; and they all, except arsenic, by rusting, form oxides, which may become bases of salts. On the properties and uses of the metals, some farther remarks will be made in the subsequent branch of Hylurgy.

Among the more important *salts*, *Glauber's salt* is the sulphate of soda, and *Epsom salt*, the sulphate of magnesia. *Alum*, is a double sulphate of alumina and potassa; *Green vitriol*, or *copperas*, is a sulphate of iron; *White vitriol*, the sulphate of zinc; and *Blue vitriol*, the sulphate of copper. *Nitre*, or *saltpetre*, is the nitrate of potassa; and *Lunar caustic*, is the nitrate of silver. *Pearlash*, and *Potash*, and salt of tartar, are carbonates of potassa; *Kelp*, and *Barilla*, are carbonates of soda; *Blue verditer*, is a sub-carbonate of copper; and *White lead* is a carbonate of lead. *Borax*, is a borate of soda; and *Glass*, a sub-silicate of potassa. *Chrome yellow*, is a chromate of lead; and *Scheele's green*, is the arsenite of copper. *Prussian blue*, is a complex salt, of iron, carbon, and nitrogen. *Sal ammoniac*, is the hydrochlorate of ammonia; and *Hartshorn*, and smelling salts, are carbonates of ammonia. *Cream of tartar* is the bi-tartrate, *Soluble tartar*, the neutral tartrate, and *Salt of lemons*, the oxalate, of potassa; the latter being poisonous. *Verdigris*, is an acetate of copper; and *Sugar of lead*, is an acetate of lead.

§ 3. *Organic Chemistry*, is that division of this science which treats of animal and vegetable substances. Most *vegetable substances*, are chiefly composed of carbon, oxygen, and hydrogen; and most *animal substances*, contain these elements, together with nitrogen; in both cases forming very complex combinations. Vegetable substances may be classed as acids; alkalies; aliments; oils and resins; alcohol and ethers; nitrogenous compounds; and coloring matters.

Among the vegetable acids, are the *oxalic*, which is poisonous; the *acetic*, which is the basis of vinegar; the *tartaric*, obtained from crude tartar in the lees of wine; and the *gallic*, obtained from gall nuts, and used for ink, and dyeing. The chief vegetable alkalies, are *morphia*, and *narcotina*, from opium; and *cinchona* and *quinia* from Peruvian bark. Among the vegetable aliments, are sugar, starch, and gum; which, by fermentation, produce alcohol, and afterwards vinegar: and among the nitrogenous compounds are gluten, vegetable albumen, and yeast. Indigo, one of the most important coloring matters, also contains nitrogen.

Animal substances, besides the elements above mentioned, frequently contain sulphur, phosphorus, chlorine, potassium, sodium, lime, magnesia, and iron. Among the animal constituents, are *fibrin*, obtained from muscular flesh; *gelatin*, or glue, from the skins, cartilages, and tendons; and *albumen*, from the white of eggs, found also in the blood: these being the chief constituents of the fleshy parts, and composed essentially of the four elements named at the head of this section. It is remarkable that while some vegetable substances contain nitrogen, and hence are peculiarly subject to the putrefactive fermentation; the animal oils, tallow, and fat, do not contain nitrogen, and hence are more permanent compounds. When the oils or fats are boiled with potassa, or soda, they are converted into distinct acids, the margaric, oleic, and stearic, which unite with these alkalies, and form soaps. The *bones* of animals, consist chiefly of carbonate and phosphate of lime; and the *blood* contains all the chemical elements which are found in the bodies that it nourishes.

§ 4. The object of *Analytic Chemistry*, is to examine substances and discover of what chemical elements or constituents they are composed. This it does, by a variety of means, which we have here no room to describe, but of which some examples may be presented. A substance containing free carbon, or carbon combined with hydrogen, will burn with oxygen; and the carbonic acid gas and watery vapor, may be collected, and measured, or weighed. Substances which will not burn, are often soluble in water or some other liquid; and in such cases they may often be tested by the precipitates which they form. Thus, all the sapho-metals, or higher metals, may be precipitated from their solutions, by adding the hydrosulphate of ammonia, or any soluble hydrosulphate; and several of the metals may be distinguished at once, by the color of the irsulphurets thus precipitated. Substances containing silicic acid, as sand, quartz, or flint, may be rendered soluble in water by heating them to redness with a large dose of potassa or soda: and the silicic acid may be separated, by its becoming insoluble on evaporating the solution to dryness. Among the best means of testing substances, is the use of the blowpipe; which by the acid of certain fusible salts, called fluxes, will melt most substances and produce certain characteristic effects.

XI. DEPARTMENT:

IDIOPHYSICS.

In the department of Idiophysics, we include the immediate study of the various productions of nature, animal, vegetable, and mineral; with their classification and description; their relations, and origin; as far as these latter can be ascertained. The name is from the Greek ιδιος, special or particular, and φυσις, nature; as this department examines the individual objects in nature, of which the preceding department traced only the phenomena, and general laws. The name Idiophysics, here introduced, is nearly synonymous with the term Natural History: but the latter term is sometimes used in a more limited sense, as when it is made to exclude Geology: though this science belongs, we think, essentially to the same group. In treating of the animal kingdom, a place must necessarily be assigned to the human race, as the head of this division: but the more immediate study of the human frame, will be reserved for the following department, that of the Medical Sciences.

The popular division of natural objects, into the three *kingdoms of nature*, as they have long been called,—animal, vegetable, and mineral,—gives rise to the corresponding sciences of Zoology, Botany, and Mineralogy; which have been also termed the classificatory sciences, for reasons soon to be explained. But Geology is also a *classificatory science;* inasmuch as it classifies, on a grand scale, the rocky strata and mountain masses which compose the outer covering of our globe. And although Geology borrows from Acrophysics the general laws and principles which it uses, in examining the structure and revolutions of the earth; the other sciences of this department do the same, whenever they find occasion. Thus, the Zoologist employs the laws of Mechanics, in studying animal motion; and the Mineralogist, particularly, is guided by the light of Chemistry, in his difficult and often dubious path. In arranging these sciences among themselves, we have been governed by the consideration that Geology is absolutely dependent on all the others, for the means of its advancement: since a knowledge of Zoology, and even of Botany, is necessary to the study of the *organic remains*, from which Geology derives many of its most important conclusions. We have therefore placed Geology last in this group, although it thereby interrupts the connexion between Zoology and the Medical Sciences.

As the study of Idiophysics, essentially requires the means of distinguishing each object, of which it treats, it should be based on a classification of all natural objects; or a *System of Nature;* founded on the most permanent and important properties, or peculiarities, of these objects; and so arranging them, that those which agree most nearly, or have the strongest points of resemblance, may come next to each other in the system. Such a system may be formed of a series of divisions, each more comprehensive than the preceding, and characterized by some more general property, till we come to the last and highest gradation in the scale. Thus, each kingdom of nature is divided into *classes*, founded on the most prominent distinctions; these are subdivided into *orders*, founded on the chief distinctions among objects of the same class; and the orders are, on the same principle, subdivided into *genera;* and these, in like manner, are composed of *species*, among which all the individual objects may be distributed. The most *natural system* of classification, is, we think, that in which the chief divisions are founded on the most important distinctions; and in which objects that most resemble each other, are placed nearest together. Any other system, founded on minor distinctions, may be characteristically termed artificial.

The laws of organic life, are, generally, not so easily tested by experiment, as those of inanimate matter: hence Zoology, and Botany, are sciences rather of observation, than of experiment; though often aided by the latter also. They are, however, governed by definite laws, no less remarkable than those of the inanimate world. Among these, we would mention, that objects which resemble each other in external form, are likely also to have strong resemblances of internal structure, and general properties. The essential law, by which all living beings, both animals and plants, are governed, is that of final causes, or *conditions of existence;* by which, their structure and functions, must be adapted to their habitation, and the circumstances in which they are placed. By this law, beasts of prey must be swift to seize, and strong to hold, their victims; birds, that dig for insects, must have sharp and hard bills; and fishes, living under water, must have corresponding organs of motion, as well as a different mode of respiration from that of animals surrounded by the air alone. To trace this principle throughout the living world, in plants, as well as animals, would require many volumes; and would afford to Natural Theology, the strongest proofs of design, and of wisdom, in the Creation.

The existence of final causes, and the marks of design, are also numerous in the mineral, as well as the organic kingdoms of nature. Thus, iron, and the more useful metals, are found the most abundantly scattered over the earth; while arsenic, and the other less useful, or even deleterious elements, are comparatively rare. Thus, again, volcanoes, which seem at first view to be agents of waste and destruction, serve rather as chimneys to the subterranean fires, to give vent to the confined gases, and prevent the recurrence of extensive and devastating earthquakes. On the uses of Idiophysical studies, we have no room to descant; though they are numerous; not only in their applications to the various arts, to the materials for which they specially relate; but also as a means of recreation, a gratification of laudable curiosity, and a clue to the designs of the Great Author of nature; whose Works, and whose Revelation, if rightly interpreted, must necessarily accord with each other.

The history of Idiophysics, might be traced back, at least to the time of Solomon; who discoursed largely of plants and animals; though his writings, if he wrote upon these subjects, are lost. Aristotle, is generally regarded as the founder of Natural History; aided, as he was, by the munificence of Alexander, in procuring rare specimens of plants and animals from the east. Among the Romans, Pliny wrote extensively on Natural History; but his writings are full of fables and exaggeration; though less so than those of Ælian. After the lapse of the dark ages, Conrad Gesner, who has been styled the German Pliny, wrote a history of animals, and gave a classification of plants, according to the character of the seeds and flowers. Aldrovandi, of Bologna, also wrote voluminously on Zoology and Dendrology; but his works are deficient both in system and accuracy. Bélon's works, on Ornithology, and Ichthyology, published about 1555, were the harbinger of a brighter age; but the first decided improvements in the method of arranging and studying natural objects, are found in Lister's Zoological works, the first of which appeared in 1678; and, next to these, in Willoughby's Ornithology and Ichthyology, and Ray's Mazology and Entomology.

The first writer who ever gave to the world an entire *System of Nature*, comprehending a classification of animals, plants, and minerals, was the celebrated *Linnæus:* who did more than any other person has ever done, towards the advancement of this department of knowledge. The system of Linnæus was first made public about the year 1730; and soon found a numerous school of admirers and improvers. Buffon, though not a profound observer, nor a systematic naturalist, gave a new interest to the study of Idiophysics, by the vivacity of his style, and the amusing information which, by the aid of his friend Daubenton, he was enabled to diffuse through his voluminous work. Among all the successors of Linnæus, none has done more for Natural History than Cuvier; as well in his *Regne Animal*, or work on the animal kingdom; as in his extensive and thorough investigations of the fossil or *organic remains*, of former races of animals; many of which are now extinct, but still, by the labors of this naturalist, are almost as well known to us, as if they were still living in our presence.

With these general remarks, we come to the individual branches of Idiophysics; which are Zoology, Botany, Mineralogy, and Geology.

CHAPTER I.

ZOOLOGY.

Zoology is that branch of Natural History which treats of animals; their appearance, structure, and functions; their classification and distribution; their instincts and their habits. The name is derived from the Greek, ζωος, living, or, ζωον, an animal; and λογος, a discourse. An *animal*, may be defined as a living being, having parts or members, more or less numerous, which are requisite to its complete structure; endowed, like plants, with organs of growth and reproduction; but differing from plants in possessing *volition*, or the power of voluntary action, to a greater or less extent, varying with the different races. In other words, animals are characterized by the attributes of life, motion, and organized form. It should be observed, however, that the animal and vegetable kingdoms of nature are connected by transitions so gradual, that it has been a difficult point to ascertain their common boundary. The study of animals, is a very extensive one, and possesses high interest; especially to the agriculturist, the sportsman, and the devout student of nature.

To the Zoological labours of Aristotle, Pliny, Gesner, and Aldrovandi, we have already alluded, in the introduction to this department; where the writings of Bélon, Lister, Willoughby, and Ray, were also mentioned, as commencing a new era in Zoology, of which Linnæus was the rising sun. Linnæus subdivided the animal kingdom into six classes; founded chiefly on the respiratory and sanguineous organs; and arranged as follows: 1. *Mammalia*, animals which have warm, red blood, and nourish their young at the breast, being mostly quadrupeds; 2. *Aves*, or birds, which have warm red blood, but produce their young from eggs, and are hence called oviparous; 3. *Amphibia*, or reptiles, which have cold, red blood, and voluntary respiration; 4. *Pisces*, or fishes, which have cold, red blood, and breathe by means of gills; 5. *Insecta*, or insects, which have the sanies, a fluid in the place of blood, cold and colorless, and are provided with antennæ, or horns; and, 6. *Vermes*, or worms, with sanies cold and colorless, and tentacula, or fleshy feelers, instead of antennæ. These classes, Linnæus subdivided into orders; those of quadrupeds characterized chiefly by the teeth and feet; those of birds, by the beak and the feet; those of fishes, by the lower fin; and those of insects, by the wings. This classification, founded on real distinctions, established Zoology on a firm basis, though occasionally imperfect, and still incomplete.

Zoology was rendered still more popular, by the fascinating writings of Buffon, already referred to; and in England it acquired a new interest, from the attractive, though still less accurate pen of Goldsmith. The *Theatrum Insectorum* of Mouffet, in 1634, was the first zoological work ever printed in England; and the works of Margrave, on Brazil, and Bontius, on India, were the first local *Faunæ*, or natural histories of particular regions. The work of Ellis, on Corallines, served to correct the views of Linnæus, by proving that these productions were of animal origin. Ichthyology was farther improved by Artedi and Bloch; and Entomology, by Fabricius and Kirby, before the era of Cuvier. The system of Linnæus was an artificial one, not always developing the most important relations of the animals which it classified. By studying the *functions* of animals, and their *conditions of existence*, Cuvier was enabled to produce a more natural system, which by the aid of Lamarck, in Conchology, and Latreille, in Entomology, he developed in his *Regne Animal;* a work of the highest order of merit.

Among the more recent zoologists, we may mention Geoffroy St.

Hilaire, and Illiger, who have made quadrupeds their particular study; Temminck and Audubon, as ornithologists; and Agassiz and Strack, as ichthyologists; who have extended the boundaries of this science, by additions and corrections. The doctrine of a *circular progression*, in the arrangement and relation of animals, propounded principally by Mr. Macleay, is doubtless true in part; and exhibits the same complexity in the classification of animals, which we have already noticed in the classification of the various branches of knowledge. In our own country, Dr. Godman has written ably on quadrupeds; as Wilson, Nuttall, and Audubon, have done on birds; and Lea on shells. The invaluable collection of specimens made by Mr. Peale, and now in the Philadelphia Museum, deserves, we think, to be mentioned, even in this brief enumeration.

We proceed to describe the Zoological system of Cuvier, under the popular heads of, 1. Zoonomy; 2. Mazology; 3. Ornithology; 4. Herpetology; 5. Ichthyology; 6. Arthrology; and, 7. Actinology.

§ 1. Under the head of *Zoonomy*, including *Comparative Anatomy*, and *Animal Physiology*, we would treat of the general structure and functions of animals. Every organic body, whether animal or plant, has a peculiar and definite *form;* which form it continues to possess, although, by accretion and excretion, the materials of which it is composed may be changed. All organic bodies have also a peculiar *structure;* consisting of solid fibres, or layers, enclosing cellular, or tubular cavities, for containing the fluids necessary for their nutrition; the whole constituting what has been called an *areolar tissue*, which is essential to every living body. Of this tissue, there are, in animals, three different kinds; the *cellular substance*, consisting chiefly of gelatine, which forms the various membranes, cartilages, and vessels that contain fluids, and which, indurated by earthy matter, forms the bones: the *muscular fibre*, consisting chiefly of fibrine, and constituting the muscles, whose contractile power is the immediate cause of animal motion; and the *medullary matter*, a pulpy substance, which chiefly constitutes the brain, the spinal marrow, and the nerves, by whose agency the mind acts on the muscles, to cause their contraction, and thus produce voluntary motion. This effect is doubtless connected with galvanic action; but the manner and laws of this action are still a mystery.

The growth of animals, is owing to the absorption and assimilation of fluids, derived from their food: while their healthiness is preserved by the exhalation or excretion of noxious and superfluous matter. Having increased in bulk to their natural limit, animals acquire an increase of density, in most of their parts, which precedes, and perhaps causes their decay and ultimate death. The races would therefore become extinct without the power of reproduction; which is perhaps the greatest mystery of life. The most essential of the animal fluids, is the *blood*, or, in lower animals, the *sanies*, which takes its place; circulating through the system, and supplying nutriment to every part, while it absorbs and removes any superfluous or deleterious matter. The blood is elaborated from the food, by means of the *alimentary system:* and, by means of the *respiratory system*, it is purified and vivified during the process of breathing. More full details of animal structure and functions, we must reserve for the next department; in which the study of the human frame will be a clue to that of the inferior races. Of *animal intelligence*, including instinct, or a natural spontaneous impulse to perform certain actions, we can only say that it differs from the human intellect, not so much in kind as in degree; and that man's sense of divine dependence and accountability are the strongest proofs of his superior rank in the scale of existence, as the connecting link between the creatures of earth and of heaven.

In the arrangement of Cuvier and his coadjutors, animals are classed under the four great divisions of Vertebrata, Mollusca, Articulata, and Radiata. The *Vertebrata*, including quadrupeds, birds, reptiles, and fishes, all have red blood, and a muscular heart, which acts as a forcing pump to circulate the blood; with distinct organs for seeing, hearing, smelling and tasting, associated in the head or face; with distinct sexes, and never more than four limbs; and with a skeleton, or at least a spine, or back bone; from the joints of which this division of animals derives its name. They all have a stomach; and all have lungs, except the fishes, which have branchiæ, or gills, in their stead. The vertebrated animals, from their more perfect organization, their higher importance in the economy of nature, and their greater interest to mankind, will form the subject of the next four sections, in this outline of Zoology.

§ 2. *Mazology*, treats of *mammalia*, or animals which nourish their young at the breast; including all quadrupeds, except reptiles; together with the whale, dolphin, and porpoise, or family of Cetacea, the study of which is sometimes termed Cetology. The mammalia are all *viviparous;* producing their young alive, and nourishing them with milk. They have a double circulation of the blood; which passes from the heart to the lungs, and thence back to the heart, before again pervading the system: but their respiration is simple, that is, performed by the lungs only. They are divided into orders; characterized by the structure of their limbs, and by their organs of manducation, or those which serve to tear and chew their food, as the teeth and claws; for on these parts their mode of life chiefly depends. The first order, *Bimana*, is confined to the human race; characterized physically by having two hands, with thumbs placed opposite to their fingers, for the purpose of seizing small objects. Of the different races of men, or rather varieties of the human race, (for they are not sufficiently distinct to form species), we have already spoken under Physical Geography. (p. 164).

The second order, *Quadrumana*, or animals having four hand-like extremities, includes the whole race of monkeys; among which are the orang-outang, the gibbon, baboon, magot, mandrel, ouistiti, and lemur. The third order, *Carnaria*, or flesh eating animals, comprises the families Cheiroptera, the bat and vampyre; Insectivora, the hedgehog, shrew and mole; and Carnivora, including the bear, raccoon, badger and glutton; the weasel, marten, skunk, and otter; the dog, wolf, fox, and hyæna; the lion, tiger, leopard, lynx, and cat; and the seal, morse, and walrus. The fourth order, *Marsupiala*, or pouched animals, comprises the opossum, phalanger, kanguroo, and wombat: the fifth order, *Rodentia*, or gnawing animals, includes the squirrel, rat, mouse, marmot, jerboa, beaver, porcupine, and hare: and the sixth order, *Edentata*, or quadrupeds without front teeth, includes the sloth, the extinct megatherium, or megalonyx; the armadillo and anteater. The seventh order, *Pachydermata*, or thick skinned animals, comprises the elephant, the extinct mastodon, the hippopotamus, rhinoceros, tapir, and swine; the extinct anoplotherium, and palæotherium, and the horse: and the eighth order, *Ruminantia*, or animals which chew the cud, includes the camel, lama, deer, giraffe, antelope, goat, sheep, and ox. The ninth order, *Cetacea*, or the whale tribe, includes the manatus or sea cow, the dolphin, porpoise, and whale.

§ 3. *Ornithology*, is that division of Zoology which treats of birds. They are vertebrated animals; oviparous, or producing eggs, with double systems of circulation and respiration; with a feathery or downy covering, long naked jaws or beak, two feet, and two wings formed for flying. They are divided into orders, according to the structure of the beak and feet, as indicating their mode of living. The first order, *Accipitres*, or birds of prey, comprehends the vultures, among which is the condor; and the falcons, among which are the eagle, goshawk, kite, and buzzard; together with the distinct family of the owls. The second order, *Passerinæ*, or sparrowlike birds, comprises the Dentirostres, or the shrike, fly catcher, thrush, mocking bird, oriole, nightingale, wren, and meadow lark; the Fissirostres, or swallow and whip-poor-will; the Conirostres, or the lark, sparrow, finch, linnet, starling, crow, rook, pie, and jay; the Tenuirostres, or the humming bird and hoopoe; and the Syndactiles, or the kingfisher and hornbill. The third order, *Scansores*, or climbers, includes the woodpecker, cuckoo, toucan, and parrot: and the fourth order, *Gallinaceæ*, or fowl-like birds, includes the hocco, peacock, turkey, pheasant, domestic fowl, grouse, partridge, quail, pigeon, and dove. The fifth order, *Grallatoriæ*, or stilted birds, includes the Brevipennes, or ostrich and cassowary; the Pressirostres or bustard, plover, and lapwing: the Cultirostres, or crane, boatbill, heron, bittern, stork, pelican, and spoonbill; the Longirostres, or ibis, curlew, snipe, woodcock, sandpiper, ruff, and avoset; and the Macrodactyles, or the rail, coot, water hen, sheathbill, and flamingo. The sixth order, *Palmipedes*, or webfooted birds, includes the Brachypteres, or diver, puffin, and penguin; the Longipennes, or the petrel, albatross, gull, tern, and skimmer; the Totipalmes, or the pelican, cormorant, and booby; and the Lamellirostres, as the swan, goose, duck, and merganser.

§ 4. *Herpetology*, treats of amphibia or *reptiles*, such as the tortoise, lizard, serpent, and frog. The study of serpents is also termed *Ophiology*. Reptiles, are cold, red blooded animals, oviparous, producing eggs with soft shells, which hatch spontaneously; and they are called *amphibia*, because most of them can live a long time under water, as well as on land; and some of them can live entirely without air for a long time. They have a heart with but one ventricle, producing only a single circulation; and their lungs receive only a part of the blood which enters the heart: hence their respiration is languid, and their motion generally slow. The first order of reptiles, *Chelonia*, or tortoises, have hard shells covering their backs, and thinner ones on the under side; with four feet, which like the head can be either drawn in, or protruded, as in the land turtle. The second order, *Sauria*, or lizard-like animals, covered with scales, and most of them having four feet and long tails, includes the extinct Ichthyosauri, with the plesiosaurus, and megalosaurus; the Crocodili, or crocodile and alligator; the Lacertidæ, or lizards; the Stellionidæ, or dragon, and ancient pterodactylus; the Iguanidæ, or iguana, and the ancient mosasaurus and iguanodon; the Geckotidæ, or geckos; the Chamelionidæ, or chamelions; the Scincoidæ, or scincus; and the Anguidæ, or seps and bipes, resembling serpents.

The third order of reptiles, *Ophidia*, or serpents, having the body exposed, or slightly covered, and with no feet, includes the Anguinæ, or glass snake; the Amphisbænæ, so named from the head and tail appearing alike; the Colubridæ, or boa, anaconda, and blacksnake; the Viperinæ, as the rattlesnake, redsnake, viper, adder, and asp; and the Cœcilidæ, or blindworm. The fourth order, *Batrachia*, or frog-like animals, with the body naked, and differing from the three preceding orders in the heart having but one auricle, includes the Anouræ, or frog and toad; the Urodelæ, or salamanders; the Amphiumidæ, or hellbenders; and the Sirenidæ, or proteus and siren, resembling eels. These last named animals, except the sirenidæ, change their primary fish-like form, at a certain age; acquiring limbs, losing their gills, and afterwards breathing like other reptiles.

§ 5. *Ichthyology*, is that branch of Zoology which treats of fishes; the last division of vertebrated animals. They live solely in the water, are oviparous, and very prolific; they breathe by means of branchiæ, or gills, consisting of laminæ covered with innumerable blood vessels, which absorb oxygen from the air existing in the water; and most of them have a scaly covering, and swim by means of four, or at least two fins, besides the tail: but in some of them the scales and fins are wanting. They are divided into orders, distinguished by the fins and the gills. The first order, *Acanthopterygii*, or spiny finned fishes, includes the Percoidæ, or perch, rock fish, and dragon weaver; the Buccæ loricatæ, or gurnard, genuine flying fish, bull head, and father lasher; the Sciænoidæ, as the king fish; the Sparoidæ, as the sheephead; the Scomberoidæ, or mackerel, tunny, sword fish, and pilot fish; the Mugiloidæ, as the mullet; the Gobioidæ, or blenny and gudgeon; the Lophioidæ, as the angler or sea devil; and the Labroidæ, as the tautog or black fish.

The next great division of fishes, is the Malacopterygii, or fishes with soft fins, which compose the next three orders. The second order, *Malacopterygii abdominales*, having the ventral or under fin behind the pectoral or side fins, includes the Cyprinoidæ, or the carp, gold fish and silver fish; the Esocidæ, or pike, and a kind of flying fish; the Siluridæ, as the cat fish; the Salmonidæ, or salmon and trout; and the Clupeoidæ, or herring, shad, and anchovy. The third order, *Malacopterygii subrachiati*, having the ventral fin under the pectorals, includes the Gadoidæ, or cod, haddock, and whiting; the Pleuronectidæ, or halibut, turbot, sole, and flounder; and the Discoboli, such as the lumpsucker. The fourth order, *Malacopterygii apodes*, having no ventral fin, includes the common eel, murena, and electric eel. The fifth order of fishes, *Lophobranchi*, having tufted gills, includes the sea horse, and pegasus. The sixth order, *Plectognathi*, or fish with cheek bones knitted to the jaw, includes the short sunfish, and the file fish. The last great division of fishes, *Chondropterygii*, having cartilaginous fins, includes the Sturiones, or sturgeon and paddle fish; the Selachii, or shark, angel fish, and saw fish, the sting ray, torpedo, and skate; and the Suctorii, or lampreys.*

§ 6. *Malacology*, including Conchology, treats of the *mollusca*, most of which are popularly called shell fish, but some of which live on the land, and some are destitute of shells. *Conchology* is properly the study of the *shells;* though sometimes applied to that of the animals themselves. The *mollusca*, Cuvier's second grand division of animals, have soft bodies, without bones, but mostly protected by shells; with a double circulation of white blood, including that from the branchiæ back to the heart; with no spinal marrow, but with nervous ganglia, or bunches, connected by filaments; having the senses of touch and taste; while those of seeing, hearing, and smelling are mostly wanting. The nautilus, and cuttle fish, having a distinct brain, are the most perfectly organized animals of this division; and they constitute the first class, *Cephalopoda*, so named from the feet or limbs being attached to the head; to which class the fossil belemnites and ammonites probably belong. The second class, *Pteropoda*, with winglike fins attached to the head, includes the clio, and limacina.

The third class, *Gasteropoda*, having a fleshy disk, instead of feet, for crawling, includes the Pulmonea, or the slug, snail, and planorbis; the Nudibranchiata, as the doris; the Inferobranchiata, as the phyllidia; the Tectibranchiata, as the dolabella; the Pectinibranchiata, or trochus, turbo, melania, nerita, crepidula, conus, cyprea, ovula, voluta, oliva, buccinum, dolium, harpa, murex, fusus, and strombus or conch; the Tubulibranchiata, as the vermetus; the Scutibranchiata, as the halyotis; and the Cyclobranchiata, or patella, and chiton. The fourth class, *Acephala*, having no apparent head, includes the Ostracea, or the oyster, the pecten, sometimes called scallop, the anomia, malleus, pinna, and arca; the Mytilacea, or muscle, and unio; the Chamacea, as the chama; the Cardiacea, or cardium, donax, tellina, lucina, and venus; the Inclusa, as the mya or clam, the solen or razor shell, the pholas, and teredo, all of which belong to the order Acephala testacea; while the thalia, ascidia, and botryllus, having no shells, form the order Acephala nuda. The fifth class, *Brachiopoda*, having fleshy arms instead of feet, includes the tere-

* Agassiz divides fishes into the four following orders: 1. *Placoidians*, having the skin covered with enamelled plates; including all the cartilaginous fishes of Cuvier, except the sturgeon: 2. *Ganoidians*, having angular scales, covered with bright enamel; among which are the bony pike, and sturgeon: 3. *Ctenoidians*, having scales with rough or jagged edges; as the perch; and 4. *Cycloidians*, having smooth scales; as the herring and salmon.

bratula and orbicula; and the sixth class of mollusca, *Cirrhopoda*, having tufted filaments instead of feet, includes the lepas or anatifa, and the balanus or barnacle. The shells of these animals are distinguished as univalves, bivalves, or multivalves; according as they consist of one, two, or more pieces.

§ 7. We would apply the name of *Arthrology* to the study of Cuvier's third grand division of animals; the *articulata;* or worms, crabs, spiders, and insects, having jointed trunks, and mostly jointed limbs. The study of worms, has received the name of *Helminthology*; and that of insects, is popularly termed *Entomology*. The nervous system of the articulata, consists of two long cords, dilated at intervals into knots, called ganglia; and their covering is composed of rings, either hard or soft; but they have in other respects wide differences, by which they are subdivided into classes. The first class, *Annulata*, including red blooded worms, is the only class of the articulata which has red blood: and it comprises the Tubicolæ, as the serpula, sabella, and terebella, which have shells; the Dorsibranchiata, having branchiæ or gills along the back, as the sand worm, eunice, and nereis; and the Abranchiata, which respire only through the skin, as the earth or angle worm, and the leech or bloodsucker.

The remaining articulata, called by Linnæus *insecta*, are distinguished by having at least six articulated, that is jointed feet. The second class, *Crustacea*, most of which have a calcareous covering, and all of which have a double circulation of sanies or white blood, includes the Malacostraca, as the crab, lobster, shrimp, and prawn, the squill, and the wood louse; and the Entomostraca, as the king or horseshoe crab, the fish louse, and perhaps the fossil trilobite. The third class, *Arachnides*, breathing by means of transverse air tubes, called stigmata, includes the Pulmonariæ, or the spider, tarantula, and scorpion; and the Trachearia, among which are the mite and the tick. The fourth class, *Insecta*, breathing by means of two longitudinal air tubes, called tracheæ, and provided with antennæ, horns or feelers, includes the Myriapoda, or centipede, and scolopendra; the Thysanoura, as the podura; the Parasita, as the louse; the Suctoria, as the flea; the Coleoptera, as the water flea, snap bug, glow-worm, and firefly, the grub, and the beetle, the cantharis or Spanish fly, the weevil fly, the cow bug, and lady bug; the Orthoptera, as the earwig, roach or cockroach, cricket, and grasshopper; the Hemiptera, as the bed bug; with the Homoptera, or locust, and cochineal insect; the Neuroptera, as the dragon fly, ephemera or May fly, the lion ant, and white ant; the Hymenoptera, as the saw fly, ichneumon fly, common ant, wasp, and bee; the Lepidoptera, or butterfly, moth, and silk worm; and the Diptera, or mosquito, crane fly, horse fly, gad fly, and the common fly. Many of these insects undergo transformations or *metamorphoses;* taking, when first hatched, the form of *larvæ*, as worms or caterpillars; which at length surround themselves with a web or *cocoon*, and are then called *pupæ*, chrysalides, aurelias, or nymphs; from which they finally emerge in their *perfect state*, many of them with wings; prepared to lay their eggs and die.

§ 8. *Actinology*, or Zoophytology, is the name applied to the study of Cuvier's fourth and last great division of animals, the *radiata*, or zoophytes: this last name signifying plant-like animals. These animals generally have their parts arranged around an axis, and radiating from it. They have no distinct circulation, or nervous system, and no other sense than that of touch; and even this, in some of them, is nearly wanting. They are mostly capable of locomotion, and nourished by digestion of food; in which points they differ sensibly from plants; though some of them are produced by the mere separation of portions, each of which becomes a perfect animal. The first class, *Echinodermata*, includes the star fish, sea urchin, and other similar genera. The second class, *Entozoa*, or Intestini, includes the Guinea worm, tape worm, and others which live within larger animals. The third class, *Acalepha*, includes the varieties of sea nettle: the fourth class, *Polypi*, growing from the bottom of the sea by stems, like plants, includes the sea anemone, tubipore, coral animal, madrepore, and spunge: and the fifth class, *Infusoria*, or animalculæ, includes all those small animals which are only visible by the aid of the microscope, as the eel-like animals in vinegar.

CHAPTER II.

BOTANY.

Botany, is that branch of Idiophysics or Natural History, which treats of plants; their structure and mode of growth; their classification, description, localities, and uses. The name is derived from the Greek, βοτανη, an herb or plant: and from φυτον, a plant, this study is also termed *Phytology*. *Plants*, or vegetables, are organized bodies; endowed with life; but differing from animals, in wanting the powers of sensation and voluntary motion. They differ from minerals, or inorganic bodies, both in possessing a principle of life, and in containing a set of organs, whereby they assimilate new matter to increase their substance; in which consists their growth. Most plants have a root, stem, and leaves; and produce flowers, and fruits, or seeds, from which their species are perpetuated: but in some plants the seeds are not perceptible, and the leaves are wholly wanting. The study of plants, should be highly interesting; not only from their beauty and variety, but from the important purposes which they subserve in sustaining animal life; and the proof, thence derived, of the harmonious designs of the Great Creator.

The chief ancient writers on Botany, were Aristotle, Theophrastus, Dioscorides, and especially Pliny; whose History of the World embodies much of the botanical knowledge of his predecessors. But they formed no general system of Botany; and, after their times, this study declined, until the modern revival of learning. The first modern work on Botany, which copied nature, rather than ancient authorities, was that of Brunfels, published in 1530. The arrangement of plants in genera, commenced with Gesner; but the origin of a natural system of classification belongs to Cæsalpinus. The description of plants, was much improved by Clusius, (or De l'Ecluse); and the nomenclature was relieved of many synonyms by the labors of the younger Bauhin. New systems of classification were proposed, by Ray in England, and by Tournefort in France; the former founded on the petals and fruit; the latter on the form, and presence or absence, of the corolla; but they both preserved the unscientific distinction between herbs, and trees. The first *Flora*, or description of plants in one locality, worthy of notice, was Ray's Catalogue of Cambridge plants, published in 1660.

It was reserved for Linnæus to mark a new era in the science of Botany; by inventing a complete artificial system, founded on the organs of fructification, as had been suggested by Quirinus Rivinus; by means of which a given plant might be more readily identified than by any other method. This system was adopted by most of his contemporaries, except Van Royen, the Gmelins, and Haller, who had systems of their own: but it has the defect of often bringing together, in the same order, plants which differ most widely in their habits and properties. Of this defect, Linnæus himself was sensible; and he endeavoured to remedy it by the addition of a natural system, in which plants should be classed according to their general resemblances. The natural method, to which the artificial may be regarded as subsidiary, is chiefly indebted to the labors of Bernard de Jussieu, and his nephew Antoine, for the degree of perfection and favor which it has since attained.

To Linnæus belongs the credit of having studied vegetable physiology, or Phytonomy, with great zeal and success; and this division of Botany has since been pursued by Duhamel, Bonnet, Malpighi, Mirbel, and Knight; whose names are connected with important investigations. Among the most extensive works on descriptive Botany, are Decandolle's Flore Française, and Willdenow's Species Plantarum; the latter of which, published continuously, like other periodicals, has become a great storehouse of botanical discoveries: but the Genera Plantarum of Endlicher, according to the natural system, will probably be the most satisfactory work on this subject, yet undertaken. The plants of Central America, were examined to a great extent by Humboldt and Bonpland; and those of North America, by Kalm, Michaux, and Pursh. Among those who have studied the Flora of the United States, the names of Bartram, Barton, Clayton, Elliott, Bigelow, Eaton, Nuttall, and Torrey, deserve a distinguished place.

We proceed to give some farther ideas of Botany, under the heads of Terminology; Phytonomy; and Systematic, and Descriptive Botany.

§ 1. *Botanical Terminology*, relates to the numerous terms which are used in describing plants, or their different parts. The principal parts of a plant, are the root, the stem or trunk, the leaves, and the organs of fructification, or flowers and fruit. The *root*, is that part which, descending into the ground, or adhering to some other substance, aids in supporting and nourishing the plant. Roots are *branching*, as in common trees; or *fibrous*, as in many grasses; or *creeping*, as in some vines; or *fusiform*, as in the parsnip; or *bulbous*, as in the turnip; or *tuberous*, as in the potato; or *granulated*, as in the wood sorrel. The *stem* of a plant, is that part which rises from the root, and supports the leaves and flowers. The stalk or stem of grasses, is called a *culm;* the flower stalk, as in dandelions, a *scape;* the fruit stalk, as in apples, a *peduncle;* and the stalk of the leaf, a *petiole.* The *leaves* of plants are the spreading organs, usually of a green color, which terminate the stems and branches. They have various forms; as *ovate*, or egg-shaped; *cordate*, or heart-shaped; *reniform*, or kidney-shaped; *palmate*, like the hand with spread fingers; *pedate*, like a bird's foot; *pinnatifid*, or half cleft; *sinuate*, or lobed; and several other forms. Of their edges, ends, surfaces, and position, we have no room to speak.

The *organs of fructification*, or those connected with the fruit, are the calyx, corol, stamen, pistil, pericarp, seed, and receptacle. The *calyx*, is the outer, or lower part of the flower; generally *colorless*, which in botany signifies having a green color. Every calyx is either *monophyllous*, consisting of but one leaf; or *polyphyllous*, consisting of more than one leaf, or *sepal*, as the calyx leaves are called. The *corol*, is the colored blossom, within or above the calyx; and its separate leaves are called *petals.* Monopetalous corols, are distinguished as bell-form, funnel-form, salver-form, wheel-form, or labiate, that is lip-form; and *polypetalous* corols are cruciform, or caryophylleous as in the pink, or liliaceous, or rosaceous, or papilionaceous as in the pea, or anomalous. The *stamens*, are organs within the corol, each terminating in an *anther* or knob, which furnishes the *pollen*, or fertilizing dust, to perfect the seed. The anthers are either *sessile*, or supported by *filaments*, which are the thread-like part of the stamen. The *pistils*, one or more in number, are the central organs of the flower; their base becoming the pericarp and seed. This base is called the *germ;* and the outer end of the pistil is called the *stigma;* which is connected with the germ, either directly, or by a short stem called the *style.*

The *pericarp*, is the fruit containing the seed; whether it be a *silique*, or bivalvular pod; a *legume*, or pod without a partition; a *capsule*, or cellular enclosure, as in the poppy; a *drupe*, as in the cherry and walnut; a *pome*, as in the apple; a *berry*, as in the currant; a *pepone*, as in the melon; or a *strobile*, as in the cone of the pine. The *seed*, consists of a *tunic*, or *integument*, covering the *cotyledons*, or fleshy parts; and the *embryo*, or corcle, which is the rudiment of the future plant. The *receptacle*, is the base, which being connected with the stem, supports the flower and fruit. Flowers are either *simple*, when there is but one on the receptacle; or *aggregate*, when there are several on the same receptacle; or *compound*, when several florets, or little flowers, have their anthers united, as in the sunflower. The different forms of the corol, and modes of inflorescence, we have no room to explain.

§ 2. The object of *Phytonomy*, or Vegetable Physiology, is to investigate the structure of plants, and their mode of growth. The seeds of plants, when mature, are scattered; by an inherent repulsive force, or by the agency of animals, or the wind; and thrown into situations more or less favorable for *germination;* that is, for the development of a new plant of the same kind. The necessary conditions for germinating or sprouting, are warmth, moisture, air, and the exclusion of light: though light is afterwards beneficial to their growth. Porous earth admits the air, but excludes the light, if the seeds are not planted too deep. The corcle, or embryo, then expands into a *radicle,* which shoots downwards to form the root; and a *plumula,* which shooting upwards, becomes the stem of the future plant: while the cotyledons are generally converted, by fermentation, into sugar, for its nourishment. Plants may be propagated, not only by *reproduction* from the seed; but also by *continuation;* whether by grafting, inoculating, transplanting, or setting out shoots or twigs in the earth.

Plants are nourished, partly by the roots, which absorb moisture, and nutritious salts, especially those of potassa; and partly by the leaves, which absorb carbonic acid, and perhaps oxygen, from the air. Their carbon is doubtless derived from the decomposition of carbonic acid; and their hydrogen from water: while a part of the oxygen is set free. The leaves, are to plants, what the lungs are to animals; but they exhale oxygen, instead of carbonic acid, at least when exposed to the light of the sun. Whether this action is reversed by night, and carbonic acid evolved, we are not prepared to say; as authorities differ thereon. In regard to the mode of growth, plants are divided into two great classes. In *monocotyledonous* or *endogenous* plants, the stem has seldom any external bark, but consists mostly of pith; and the growth takes place at the centre; while the preëxisting parts are thereby crowded outwards, and compressed, as in the palm tree, and Indian corn. But in *dicotyledonous,* or *exogenous* plants, the growth takes place externally, between the wood and the bark, as in the elder, or oak. The stem of exogenous plants, consists of the *pith,* or soft central core; the *heart wood,* or hardest part, and the *sap wood,* or alburnum, which is the outer and softer part of the wood; the *liber* or inner bark, strong and fibrous; the *cellular integument,* or middle bark; and the *cuticle,* or outer bark, probably lifeless, and serving merely to protect the parts within.

The substance of plants, is generally porous, and consists of either *cellular* or *vascular texture;* the former composed of cells, and existing in the pith, bark, and leaves; while the woody part is chiefly vascular, consisting of tubular fibres. The *sap* of plants, is a limpid liquid, which rises from the roots to the leaves, it is said, through the *medullary sheath,* consisting of spiral vessels surrounding the pith; and after respiration, it descends through the liber, or inner bark, underneath which it deposits the *camb,* a mucilaginous substance; and from this a new annual layer of wood is formed, by which the age of exogenous plants may be known. The *proper juices,* or peculiar fluids, secreted by plants, as gum, oils, and the like, are said to be elaborated by glandular knots, analogous to the glands of animals.

§ 3. Under the head of *Systematic Botany,* we proceed to describe briefly the two great systems of classification of plants, which have prevailed in recent times. It was known, before the time of Linnæus, that the seeds of plants cannot be perfected from the pistil alone, but require the agency of the pollen, or pulverulent, fertilizing substance, from the stamens. Thus, if we cut off the tops, or staminate flowers of Indian corn, before the pollen has fallen on the silk of the ears, these latter, which contain only pistillate flowers, will not fill out with kernels. Hence, those alone are called *perfect flowers*, which contain both stamens and pistils; and the importance of these organs induced Linnæus to make them the basis of his *artificial system* of classification. In this system, the classes and orders are founded on the number, positions, and other relations of the stamens and pistils.

The first ten classes are *Monandria*, having one stamen; *Diandria*, two; *Triandria*, three; *Tetrandria*, having four equal stamens; *Pentandria*, five; *Hexandria*, six; *Heptandria*, seven; *Octandria*, eight; *Enneandria*, nine; and *Decandria*, having ten stamens. The 11th class, *Icosandria*, has more than ten stamens, inserted on the calyx; and the 12th, *Polyandria*, has the same, but not situated on the calyx. The 13th class, *Didynamia*, has two long stamens and two short, with labiate flowers; and the 14th, *Tetradynamia*, has four long, and two short stamens, with the flowers cruciform. The 15th class, *Monadelphia*, has the stamens united by their filaments, in one set; and the 16th, *Diadelphia*, has them in two sets, with papilionaceous flowers. In the 17th class, *Syngenesia*, the flowers are compound, and the florets have their stamens united by the anthers. The 18th class, *Gynandria*, has the stamens growing on the pistil, and separate from the corol. The 19th class, *Monœcia*, has the stamens and pistils in different flowers, but on the same plant; while the 20th, *Diœcia*, has them not only in separate flowers, but on separate plants. In the 21st class, *Cryptogamia*, these organs are either wanting, or invisible, or very caduceous.

In the first twelve classes, the orders are founded on the number of pistils, whether with styles, or only with sessile stigmas. These orders are *monogynia*, having one pistil; *digynia*, two; and so on, following the Greek numerals, to *decagynia*, having ten, and *polygynia*, having more than ten pistils. The 13th class has two orders, *gymnospermia*, with naked seeds; and *angiospermia*, with the seeds in a capsule. The orders of the 14th class, are *siliculosa*, having round pods; and *siliquosa*, with pods long and narrow. In the 15th, 16th, 18th, 19th, and 20th classes, the orders are distinguished by the number of stamens, and have the same names as the first twelve classes; but in the 17th class, the orders are *æqualis*, having all the flowers perfect; *superflua*, having the disk or central florets alone perfect; the ray florets, if any, being pistillate; *frustanea*, having the disk florets perfect, but the ray florets neutral; *necessaria*, having the disk florets staminate, but the ray florets pistillate or fertile; and *segregata*, having a separate perianth, or calyx, for each floret, as well as for the whole flower. The 21st class is divided into the natural orders of *filices*, or ferns; *musci*, or mosses; *hepaticæ*, or liverworts; *lichenes*, or lichens, with leafless stems, often growing on rocks; and *fungi*, or mushrooms, and similar plants.

The *genera* of plants, are farther distinguished by characters of the flower and fruit; while the *species*, are distinguished by the leaves, and other minor differences. In general, plants of the same genus possess similar medical and other properties; but this rule does not apply to the Linnean classes and orders; which, as we have before remarked, bring together plants of widely different characters. To remedy this deficiency, is the object of the *natural system;* in which plants are arranged in the three classes of *dicotyledonous*, *monocotyledonous*, and *acotyledonous*, distinguished by the number of cotyledons found in the seed, which is deemed a predominant characteristic. The farther explanation of this system, we must reserve for the next section; in order to connect it with references to as many important plants as we have room to mention.

§ 4. *Descriptive Botany*, properly includes a description of plants, duly arranged; by means of which the genus, species, and properties of any given plant may be recognized. We shall here connect it with the natural system; and commence with the *dicotyledonous*, or *exogenous* class of plants: which have stems of bark, wood, and pith; leaves with branching veins; the parts of the flower usually with a four fold or five fold division; and the seeds with two or more cotyledons. This class is divided by Lindley into three subclasses; *polypetalæ*, having distinct petals, as the rose, and pink; *monopetalæ*, having but one petal, forming the corol, as in the currant and potato; and *incompletæ*, without petals, as the walnut, oak, and buckwheat; to which other writers have added a fourth sub-class, *anomalæ*, including the achitospermous plants, which have no covering to the seed, as the pine and cedar.

The polypetalous plants, are divided by Lindley into the *albuminous group*, having the embryo of the seed shorter and smaller than the albumen or mealy part, as in the currant and grape; the *epigynose group*, having the flower above the ovary or seed vessel, as in the cucumber and melon; the *parietose group*, having the placenta to which the seeds are attached, parietal or forming a wall around them, as in the cabbage and violet; the *calycose group*, having two sepals of the calyx exterior to the others, as in the maple and flax; the *syncarpous group*, having the carpels or pods compactly united, as in the hollyhok and pink; the *gynobaseose group*, having five carpels or fewer, around an elevated axis, as in the geranium and nasturtion; and the *apocarpous group*, having the carpels or pods distinct, as in the rose, apple, peach, pea, and clover.

The monopetalous plants, comprise the *polycarpous group*, having the ovary composed of many carpels, as in the honeysuckle and whortleberry; the *epigynose group*, having the flowers above the ovaries, usually with two carpels, as in the cardinal flower and elder; the *aggregose group*, having the ovary composed of but one perfect carpel, as in the dandelion, thistle, and daisy; the *labiose group*, having ovaries of two carpels, within unsymmetrical flowers, as in sage, and mint; and the *dicarpous group*, having ovaries with two carpels, within symmetrical flowers, as in the ash, potato, and tobacco.

The incomplete dicotyledonous plants, comprise the *rectembrose group*, having the embryo straight, and the calyx very imperfect, as the oak, chesnut, birch, mulberry, walnut, elm, hop, and hemp; the *achlamydose group*, having neither calyx nor corol, as the willow, poplar, and buttonwood, to which Lindley adds the achitospermous plants, the pine, yew, cedar, and sago; the *tubiferous group*, having a tubular calyx, as the sassafras; and the *curvembrose group*, having the embryo curved, as in the beet, and buckwheat.

The second class of plants, the *monocotyledonous*, or *endogenous* plants, are characterized by the wood and pith being mingled, and the true bark wanting; the leaves having parallel veins; the parts of the flower being ternary or threefold; and the perianth often in two rows. This class is divided by Lindley into the *epigynose group*, having complete flowers, above the ovary, as in flower-de-luce, and saffron; the *spadicose group*, with herbaceous or imperfect flowers, as in the sweet flag, cat-tail, and asparagus; the *glumose group*, with scale-like bracts attached to the flowers, as in wheat, oats, orchard grass, rice, cane, and Indian corn; the *hypogynose group*, having the ovary within a colored flower, as in the palm, lily, tulip, onion, and bulrush; and the *gynandrous group*, having the stamens united with the styles, as in the ladies' slipper.

Of the *acotyledonous* or *acrogenous* plants, which constitute the Linnean class of cryptogamia, we have already given some idea, in mentioning the Linnean orders. They are cellular plants, wanting in proper vessels, growing by increase at the extremities, and propagated by means of sporules, instead of perfect seeds.

CHAPTER III.

MINERALOGY.

Mineralogy, is that branch of Idiophysics, or Natural History, which treats of minerals; their classification, composition, properties, and uses. The name is derived from the word *mineral:* and this from the French word *mine*, a mine; because from mines are many of the most valuable minerals derived. This science has also been termed *Oryctognosy*, from the Greek, ορυκτος, or fossil, and γνωσις, knowledge or science. A *mineral*, as the term is now used, signifies any inorganic natural substance; whether gaseous, as the air; or liquid, as water; or solid, as stones and earths: but the term *fossil*, from the Latin *fodio*, I dig, is now applied exclusively to organic remains; that is remains of plants or animals, which have been buried in the earth; the study of which pertains, in part, to the preceding branches. The study of Mineralogy, is limited to simple minerals, considered independently or individually; and the study of their arrangement, or association, in the strata which compose the surface of our globe, together with the distribution of fossils therein, is reserved for the science of Geology. But, considered even in this limited sense, Mineralogy is a science not devoid of interest;

whether it examines the stones from which the vegetable soil is derived; or the ores which yield the useful and precious metals; or the gems which grace the brow of beauty or the diadems of kings.

Aristotle and Pliny wrote vaguely on minerals; but the first regular classification of them appears to have been made by Avicenna, the alchemist; who divided them into stones, metals, inflammables and salts. A similar classification was made by Agricola; and another by Beccher, the first writer on Chemistry; who regarded all minerals as composed of salt, sulphur, mercury, earth, and water. The first idea that certain minerals always crystallize in certain particular forms, may be traced to Gulielmini, in 1707: but Linnæus had the merit of first pointing out the importance of crystallography, in classifying and examining minerals. His views on this subject were corroborated by the researches of De Lisle; and especially by the Abbé Haüy, who first examined the cleavage of minerals, and applied the atomic theory to account for their formation. Meanwhile, Werner, in his work on the *External Characters of Fossils*, (as minerals were then termed), in 1774, attained great precision in describing minerals; particularly by means of their color, lustre, hardness, and specific gravity: but in classifying minerals, he adopted a system, like that of Haüy, partly natural, and partly chemical, as first proposed by Cronstedt, in 1758.

The views of Haüy, concerning primary and secondary forms of crystals, were corrected, in various instances, by Weiss; who, in 1809, gave a new classification of crystals, forming several crystalline systems, or groups, founded on the axes of figure, and such that those of the same group might be derived from each other. This true, and probably ultimate theory, was applied by Mohs to all the known species of minerals; and in his Outlines of Mineralogy, published in 1822, it was made the basis of a natural classification of minerals, closely resembling those of animals and vegetables now prevailing. This system, as at present modified and simplified, agrees so far with the chemical, as to show that it has a foundation in nature; although it doubtless admits of farther modifications and improvements; and although the mixed system has been adopted by Brongniart, and more recently by Naumann of Freiberg, who excels in the department of crystallography. The purely chemical classification, proposed by Berzelius, founded on the electric relations of the chemical elements, has failed of giving a fixed character to the science, or of coming into general use. In our own country, the mixed system was adopted by Cleaveland; but the natural classification has been preferred by Dana, in his recent valuable work; which we here propose to follow, as far as our limits will allow.

We proceed to give a brief synopsis of Mineralogy, under the heads of Crystallography, and Idiographic, Systematic, and Descriptive Mineralogy.

§ 1. The science of *Crystallography*, has for its object the examination of crystalline forms: and its connection with Mineralogy arises from the fact that most of the crystalline forms, with which we are acquainted, belong to simple minerals; and that each mineral species, wherever it is found crystallized, is limited to certain simple forms, or groups of forms, by which its composition and properties may often be recognized. Minerals which have no regular shape, are said to be *amorphous.* Others have what is called *imitative forms;* as *dentiform*, or tooth-shaped; *filiform*, or thread-like; *dendriform*, or tree-shaped; *pectiform*, or comb-shaped; *reniform*, or kidney-shaped; and *botryoidal*, resembling a cluster of grapes. But of all the mineral species known, the larger portion are found, at least occasionally, having a regular *crystalline form*, subject to mathematical laws: and these forms alone are the object of the present section.

A *crystal*, is an inorganic solid, bounded by plane surfaces, and usually possessing a homogeneous structure. The bounding surfaces are called *faces;* the lines of intersection, *edges;* the angles of the faces themselves, *plane angles;* those which they form with each other, *interfacial angles;* and an angle formed by three or more faces, meeting in a point, is called a *solid angle.* The forms of crystals are considered as either *primary*, or *secondary;* the latter being derivable from the former, either by excision or by accretion. Crystals generally admit of *cleavage*, or splitting; and when this can take place only in one direction, the cleavage is said to be single; but when in two directions, *double;* and it may also be triple or quadruple. When the edges or angles of a crystal are cut off by a plane equally inclined to the sides which it cuts, they are said to be *truncated;* but when the edge is replaced by two faces, equally inclined; or an angle replaced by as many such planes as there are contiguous faces, they are then said to be *bevelled.*

All those crystalline forms which are reducible to one and the same primary form, are said to constitute a crystalline *system.* There are seven of these systems, distinguished by the relations of their axes. In the *monometric*, or regular system, the three axes are equal, and at right angles to each other; as in the cube, the axes of which are the lines joining the centres of the opposite sides; and in the regular octahedron, and the rhombic dodecahedron, derived from the cube by truncating all or a part of the edges; these figures having their axes joining the vertices of opposite angles. The *dimetric* system, has one axis either longer or shorter than the other two, as in the right square prism: and the *trimetric* system has all the axes unequal, but still at right angles; as in the right rectangular prism. The other systems, which we have no room here to describe, have one or more of their axes oblique. An instrument for measuring the angles of a crystal, is called a *goniometer;* one form of which, invented by Wollaston, employs for this purpose the reflection of light.

§ 2. Under the head of *Idiographic Mineralogy*, we would treat of the various physical and chemical properties of minerals; which serve, often in part, and for amorphous minerals entirely, to aid us in recognizing them. We speak here only of *simple minerals;* all the separable particles of which are homogeneous: as the study of compound minerals formed by the aggregation of two or more simple ones, belongs to the study of Geology. The *physical* or external properties of minerals, are those which are obvious by mere inspection, or by the aid of some simple mechanical experiment. Such are the color, lustre, hardness, and specific gravity; which are easily noted, and are, perhaps, the most important external characters to which we can refer.

The *color*, of earthy minerals, may vary from a very slight admixture of foreign ingredients; but in ores, it is a better test of the composition. The colors selected by Werner, as standards for the comparison of minerals, were the eight following: snow white; ash gray; velvet black; Prussian blue; emerald green; lemon yellow; carmine red; and chesnut brown. Besides the colors of minerals in mass, that of their *streak*, when abraded by a file, is often a useful characteristic. The *lustre* of minerals, is distinguished as metallic, vitreous, resinous, pearly, silky, or adamantine; either of which may vary in intensity. As regards the transmission of light, minerals are either transparent, translucent, or opaque: and some minerals are characterized by the degree of *refraction*, or by the double refraction of light; as others are by the property of *phosphorescence*, or assuming a luminous appearance by friction or by heat.

The *hardness* of minerals, is often an important characteristic; and is expressed, in the manner which Mohs proposed, by a scale of numbers, referring to a series of minerals, each of which will scratch any one of the preceding. The scale, thus constructed, is as follows: 1. talc; 2. rock salt; 3. calcareous spar; 4. fluor spar; 5. apatite; 6. feldspar; 7. quartz; 8. topaz; 9. sapphire; and 10. diamond; which is the hardest substance known. To these, Breithaupt has added two intermediate degrees; $2\frac{1}{2}$, foliated mica; and $5\frac{1}{2}$, scapolite; subdividing the largest intervals of the scale. As regards their *aggregation*, minerals are either brittle, sectile, malleable, flexible, or elastic: and their fracture is either conchoidal, even, uneven, or hackly, as in broken iron. The *specific gravity* of minerals, is found, on the principles of Hydrics, by dividing the weight of the mineral by the weight of an equal bulk of water; which is the loss of weight when it is suspended in water. Minerals are also characterized, in some few cases, by their *electric*, or *magnetic* properties, or by their taste, or odor.

Among the chemical properties most frequently employed by the mineralogist, are the action of acids, and the effects of the blowpipe. The *acids* used for this purpose, are chiefly sulphuric, nitric, and muriatic, in a diluted state. Most of the carbonates, when exposed to either of these acids, are decomposed, with effervescence of carbonic acid gas; and most of the sulphurets, when acted upon by either sulphuric or muriatic acid, especially with the aid of heat, are recognized by the fetid odor of the sulphuretted hydrogen, otherwise called hydrosulphuric acid, which they evolve. The *blowpipe*, is a tube, one end of which is applied to the mouth, and the other end terminates in a small orifice, through which a jet of air is thus forced into the flame of a lamp or candle, causing a conical flame, of intense heat, to protrude in the direction of the jet. By this flame, the *fusibility*, or *combustility*, of minerals is tested; and many refractory minerals are rendered fusible by adding some salt, as a *flux;* while the color and appearance of the melted drop, or bead, thus obtained, often indicates their composition. The complete analysis of minerals, requires a thorough acquaintance with all the resources of chemistry.

§ 3. Under the head of *Systematic Mineralogy*, we are to speak briefly of the different systems according to which minerals have been classified and named. The object of the *chemical system*, is to place together those minerals which most resemble each other in composition; while that of the *natural system*, is to associate those which most resemble each other in their general properties. The chemical classification, adopted by several writers, usually commences with the *non-metallic minerals*, the gases, combustibles, and non-metallic acids: proceeding next to the *salts;* both the soluble salts, or those commonly known as such; and the earthy salts, or *earths;* which are mostly salts of silicic acid: and the list is usually completed by the higher *metals*, and their various ores; of which the oxides and sulphurets are the most important.

In the natural classification, as proposed by Mohs, and modified by Dana, all minerals are divided into three classes: *Epigæa*, or minerals found mostly on the earth's surface, as gases, acids, and soluble salts, of all of which, the specific gravity is less than 3·8: *Entogæa*, or minerals found mostly within the earth; insoluble and tasteless, and all having a specific gravity above 1·8: and *Hypogæa*, or minerals which were once on the earth's surface, being of vegetable origin; but have since been buried; as the coals and resins. These classes are subdivided into *orders;* which we shall briefly describe in the following section. The orders have been farther subdivided into *genera*, and *species*, which we shall not in this work have room to describe. We can only mention the most important species, giving them their common or trivial names; which are for the most part arbitrary, and often derived from the names of individuals who have distinguished themselves in this science.

§ 4. Under the head of *Descriptive Mineralogy*, we proceed to give some idea of the more prominent minerals, arranged according to the natural orders of Dana; with some remarks on their properties and uses. The first class, Epigæa, is divided into two orders, Rheutinea, or fluids, and Sterinea, or solids. The order *Rheutinea*, includes the native gases; or carburetted hydrogen, which is the same as coal, or oil gas; phosphuretted hydrogen, which is spontaneously inflammable, and the cause of the ignis fatuus; sulphuretted hydrogen, known by its fetid odor; atmospheric air, essential to animal life and ordinary combustion; carbonic acid, or the choke damp of mines, fatal to animals confined in it; and sulphurous and muriatic acids, suffocating gases, evolved from volcanoes. This order includes also the native liquids; water, and sulphuric and muriatic acids; these latter being in a dilute state. The order of *Sterinea*, or solids, includes boracic and arsenious acids, found sparingly; borax, or borate of soda, useful as a flux to cause other minerals to melt; alum, which is sometimes found native; solfatarite, or soda alum; natron, a hydrous carbonate and sulphate of soda; common salt, found in mines, springs, and the sea; Glauber's salt, and Epsom salt, useful in medicine; sal-ammonic, nitre, and the vitriols, useful in the arts; and polyhalite, a complex sulphate of lime, potassa, and other bases.

In the second, or Entogæan class of minerals, the order *Halinea*, or saline minerals, includes alum stone, from which alum is made; fluor spar, or fluoride of calcium, used for ornaments; apatite chiefly phosphate of lime; gypsum, and anhydrite, both sulphate of lime; calcareous spar, and arragonite, carbonates of lime; and dolomite, or magnesian limestone. The order *Barytinea*, or heavy earthy minerals, includes strontianite, and celestine, or the carbonate and sulphate of strontia: witherite, and heavy spar, or carbonate and sulphate of baryta; bismuth blende, and calamine, or silicate of bismuth, and carbonate of zinc; spathic iron, or brown spar, a carbonate of iron; white lead, or carbonate of lead; chromate of lead, or chrome yellow; blue and green malachite, carbonates of copper; and uranite, chiefly phosphate of uranium. The order *Ceratinea*, or hornlike minerals, includes horn-silver, and horn quicksilver, chlorides of silver and mercury; and iodic silver, having also a resinous lustre. The order *Osmerinea*, or minerals possessing odor, includes allophane, or hydrous silicate of alumina; serpentine, or hydrous silicate of magnesia; also native magnesia; with talc, and steatite, or soapstone, which are chiefly silicates of magnesia; and chlorite, and nacrite, silicates of alumina and iron.

The order *Chalicinea*, or silicious minerals, includes mica, improperly called isinglass, it being a silicate of alumina, potassa, and iron; feldspar, or silicate of alumina and potassa; hornblende, or silicate of magnesia, lime and iron; and turquois, and lazulite, of a rich blue color. The order *Hyalinea*, or glass-like minerals, includes tourmaline, chiefly a silicate of alumina and iron; the beryl, and chrysoberyl; the sapphire, which is pure alumina; the diamond, or pure crystallized carbon; the topaz, and chrysolite; quartz, or pure silex; the garnet, and zircon. The order *Scaptinea*, or excavated minerals, includes most of the ores of the metals, other than sulphurets; most of them being oxides, or containing oxygen. The order *Metallinea*, includes the native metals, and their alloys, having a bright metallic lustre. The order *Pyritinea*, includes those sulphurets of the metals, usually called pyrites, which have a full metallic lustre; as iron pyrites, or bisulphuret of iron; and copper pyrites, a double sulphuret of iron and copper; both these minerals resembling gold in appearance. The order *Galinea*, or shining metals, also comprises chiefly sulphurets having a metallic lustre, but a darker color than those of the preceding order; as tin pyrites, or sulphuret of copper and tin; galena, or sulphuret of lead; and the sulphuret of bismuth. The order *Adelinea*, or minerals of imperfect lustre, includes those sulphurets, and similar minerals, the metallic lustre of which is not very manifest; as blende, or sulphuret of zinc; cinnabar, or sulphuret of mercury; and realgar and orpiment, sulphurets of arsenic. The last order, *Theiinea*, is confined to native sulphur, chiefly of volcanic origin.

The third class of minerals, Hypogæa, is subdivided into two orders; the first of which, *Pittinea*, or pitch-like minerals, easily fusible, includes amber, retinasphaltum, and bitumen: and the second order, *Anthracinea*, or coal-like minerals, infusible, but combustible, includes bituminous coal, which burns with a flame; anthracite, which burns without flame; and graphite, which is a compound of carbon with a small portion of iron, improperly called black lead. We are constrained to express the opinion, that a still more natural classification of minerals might be formed; and that the distinctions of being soluble, or earthy, or metallic, or inflammable, would be proper types for four classes in which all minerals might naturally be arranged.

CHAPTER IV.

GEOLOGY.

Geology is that branch of Idiophysics, or Natural History, which treats of the structure of the earth, and the masses which compose it; and of the changes, both organic and inorganic, which it has hitherto undergone, or to which it is still exposed. The name is derived from the Greek, γη, the earth; and λογος, a discourse: and this branch has also been termed *Geognosy*, from another Greek word signifying knowledge, or science. As it is impossible to understand the structure of mountain masses and rocks, without knowing the simple minerals which compose them, the study of Geology evidently presupposes and depends upon a knowledge of mineralogy. As it includes the study of *organic remains*, or fossil plants and animals, the study of which has received the name of *Paleontology*, its connection with the other natural sciences will be distinctly perceived; and the more so, the farther we advance in its attainment. While its practical importance, in the arts of Agriculture, Mining, and Engineering, is generally recognized, it ranks with Archæology in its recondite researches, and with Astronomy in the sublimity of its themes and results, as one of the most profound and interesting of the sciences.

Among the ancient philosophers, Thales believed that the earth was of aqueous origin; an idea probably derived from the Egyptian priests: while Zeno maintained that it was produced by the action of fire. In modern times, Agricola of Saxony, and Bernard de Palissy in France, were among the first to promulgate rational views of the formation of minerals. Leonardo da Vinci, about A. D. 1500, observing the shells of the Appenines, boldly maintained that those mountains were formerly covered by the sea; an opinion which thenceforward found advocates, and elicited new researches. The idea of geological maps, appears to have originated with Dr. Lister, in 1683; and the first notice that rocks and earths occur in regular strata is attributed to Mr. Woodward; who founded a geological museum, as early as 1695. The division of rocks into primary, and secondary, was first made by Lehman of Germany, in 1756, and confirmed by Arduino, in 1759: and a more minute classification was introduced by Werner. The importance of the study of fossils, in geological classifications, was first brought into view by Mr. Smith of England, about the year 1793: but it was more fully appreciated in the great work of Cuvier and Brongniart, on the Environs of Paris, published in 1811; and further illustrated in Cuvier's work on Fossil Bones, in the following year.

The aqueous, or *Neptunian theory*, of Thales, was revived, in 1740, by De Maillet of France, in a work entitled *Telliamed:* and this opinion was adopted by Linnæus, and Werner. Werner carried this theory so far as to maintain that all superficial or superincumbent rocks were formed by deposition in water: but the opposite, or *Vulcanian theory*, that basaltic and trap rocks, though lying on the earth's surface, are of igneous origin, having been cooled from a melted state, was revived by Hutton, about the year 1785; and afterwards maintained by Playfair; and finally admitted by all parties to be correct. The theories published by Burnet in 1681, and by Whiston in 1722, were merely crude speculations.

Leibnitz and Buffon maintained that the earth was originally in a state of igneous fusion; and that its whole interior is still in a melted state, owing to the intense central heat. Mr. Lyell, has discarded the doctrine of central heat, in his Principles of Geology, published in 1830, in which he attempts to explain the former changes of the earth's surface, by causes now in action: a doctrine which, in a qualified sense, may doubtless be true. Dolomieu was one of the first geologists who studied carefully the nature of active volcanoes; and new light was thrown on this subject by the researches of Humboldt in Central America, 1799–1804. Saussure, in his travels, made many important geological observations; as did also Professor Pallas, who examined the minerals and fossils of Russia and Siberia. The geology of Great Britain has been extensively illustrated by the labors of Jameson, Conybeare, Phillips, Sedgwick, Buckland, Murchison, De la Beche, and others already named; as that of France by Brochant de Villiers, Elie de Beaumont, Dufrénoy, and others. Our own country is at present the theatre of extensive geological explorations, by zealous and competent observers; but we have only room to cite the names of Maclure, Silliman, and Eaton, as pioneers of American geology; and of Prof. Hitchcock, Dr. C. T. Jackson, Professors H. D. and W. B. Rogers, and W. W. Mather Esq., as gentlemen charged with important geological state-surveys.

We proceed to give an outline of this science, under the heads of Introductory, Systematic, Descriptive, and Physical Geology.

§ 1. Under the head of *Introductory Geology*, belongs a description of the different rocks which compose our globe, so far as they are accessible to examination. The term *rock*, is applied by geologists, not only to the hard masses usually so called, but also to the various soft or pulverulent substances, derived from the former, by disintegration, or pulverization, and commonly called *earths*. The hard rocks, are either *simple minerals*, such as are studied under Mineralogy; or composed of two or more simple minerals, united by aggregation. Among the minerals which occur in large masses, and hence may be called *simple rocks*, are quartz, feldspar, hornblende, serpentine, gypsum, and limestone, or marble.

Of composite rocks, *granite* is an aggregate of quartz, feldspar, and mica; with which hornblende is sometimes intermingled; but it is then more properly called *sienitic granite*. The name *sienite*, is applied to an aggregate of feldspar and hornblende, sometimes mingled with quartz; and when fine grained, and of a greenish color it has also been termed *greenstone*. *Protogine*, is a granite in which the mica is replaced by talc, steatite, or chlorite; rendering it softer. When feldspar is found intermingled with augite, hypersthene, or diallage, the rock thence resulting is named from one of the latter three minerals: and *diallage rock* is often found associated with serpentine. *Gneiss* differs from the preceding granitic rocks only in being stratified, or found in layers; and *mica slate*, differs from gneiss chiefly in being stratified in thinner layers, caused by the mica being diffused in parallel directions through the quartz.

The name of *trap*, or *trappean rocks*, is applied to those which contain a considerable portion of feldspar, hornblende, or augite, and are supposed to have been ejected from the interior of the earth in a melted state. Indeed, the trappean rocks pass by insensible gradations, on the one hand into granite and gneiss, and on the other into basalt, and similar rocks of known volcanic origin. *Basalt*, is now considered as a trappean rock; analogous to greenstone, or augite rock, in its composition: and *wacke* is a softer kind of basalt. *Porphyry*, is an aggregate of large crystals, usually of feldspar, imbedded in a cement or basis of feldspar, or some allied mineral. *Graywacke*, is an aggregate of various small mineral fragments, angular, flat, or rounded, united by a silicious cement; and *conglomerate* or puddingstone, is an aggregate of larger pebbles, or boulders, united by a silicious, argillaceous, or ferruginous cement. *Amygdaloid*, is a rock usually of basalt, wacke, or greenstone, in which are vesicular cavities, more or less filled up with various minerals, apparently formed there by infiltration. *Breccia*, is an aggregate of angular fragments, of one or more minerals, united by some cement. *Sandstone*, is chiefly composed of grains of quartz, united by a cement, which may be calcareous, argillaceous, or silicious, and is often colored red by the oxide of iron. *Argillite*, or clay slate, consists of indurated clay, often interspersed with particles of other minerals; and passing, by imperceptible gradations, into silicious slate, containing a large portion of silex, or sand.

§ 2. Under the head of *Systematic Geology*, we would comprise a general analysis of the structure of the earth; reserving for Descriptive Geology, the application of this analysis, to the description of the various countries and regions which have yet been explored. The study of *Palæontology*, so far as it relates to the characters of ancient plants and animals, belongs to the branches of Botany and Zoology; but in so far as it examines what particular species are found in particular strata or formations, we would include it in the present section. On penetrating deeply into the earth, at various contiguous places, we find its mass to be composed of numerous *strata*, or layers, usually nearly horizontal, though sometimes much inclined. The strata which are inclined, are said to *dip;* and the direction in which they descend most rapidly, is called the *direction* of the dip. When, from a certain ridge, the strata dip or decline in opposite directions, that ridge is called an *anticlinal* line or axis: and when the strata decline, on both sides, towards a line of meeting, this latter is called a *synclinal* line or axis. Strata which are twisted, or bent, are said to be contorted: and they are said to be *conformable*, when their surfaces are nearly parallel; but *unconformable*, when this is not the case.

When the strata present their edges so as to be visible at the surface, they are said to crop out: and when their outcrop is abrupt or precipitous, it is called an *escarpment*. Detached portions of strata, which remain elevated, while the surrounding parts have been removed, are called *outliers*. A stratum of small extent, is called a *bed;* and a very thin stratum is sometimes called a *seam*. When the strata have been apparently broken across, and those on one side raised above those on the other, so as to break the continuity, this break is called a *fault*. When some volcanic or other matter has been injected into the break, so as to form a wall or partition crossing the strata, this wall is called a *dyke;* or, if small, a *vein;* such as often contain metallic ores. A series of rocks supposed to have been produced at about the same time, is called a *formation*.

The lowest rocks which have been examined by geologists, are found to contain no organic remains, and no coal nor salt: but they bear the marks of igneous origin, and are supposed to have crystallized in cooling from a melted state, before the higher strata were formed, or any animals existed. Hence they have been called *primary rocks;* including granite, sienite, and similar rocks, which are the lowest, and unstratified; and gneiss, mica slate, and primary limestone or marble, which are all stratified, and crystalline, when they belong to this formation. These rocks extend beneath the lowest valleys; but protrude above them, and form the masses and tops of the highest mountains; towards which the strata incline upwards, as if the mountains were upraised by a subterranean force. Talcose and chloritic slates, and quartz rock, occupy extensive areas of the earth's surface; but their crystallization is less distinct than in those before mentioned; and these rocks are, in many places *metamorphic*, or more or less altered by heat, from injected igneous rocks, as trap dykes, or granite, sienite, and quartz veins.

The rocks next above the primary, have been called *transition rocks;* including the Cambrian and Silurian systems: and they contain occasional shells, as the ammonite, (Plate IX. Fig. 1.), the belemnite, (Fig. 2.),* the orthoceratite, (Fig. 3.), and the trilobite, (Fig. 4.); some fishes, as the orodus, of the shark family, (Fig. 5.); with some zoophytes, marine plants, algæ, and ferns, but no organic remains, of a higher class, and but slight traces of coal or salt. They include argillite or clay slate, graywacke, granular limestone, gypsum, and sometimes granite: but the granite, and similar rocks, which occasionally overlie the slate or limestone, were probably ejected from below, and deposited, like lava from volcanoes, long after the primary formations. Transition strata often extend up the sides of primary mountains; and sometimes constitute extensive mountain

* The belemnite appears to have been the internal shell or skeleton of an animal resembling the cuttle-fish, hence called, by Buckland, the *belemnosepia*.

ranges. We may here remark that the animals delineated in Plate IX.; several of them restorations from the skeletons, are all of genera which are now extinct.

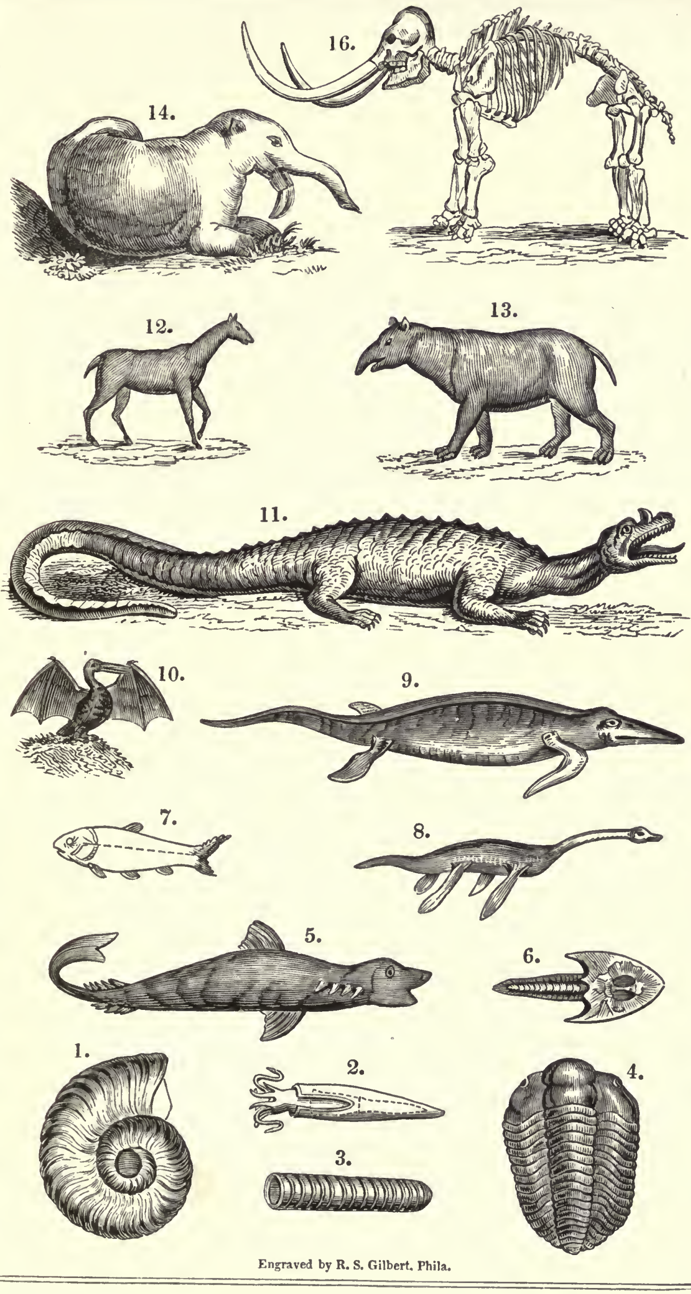
Next above the transition strata, are the *secondary rocks;* which include numerous organic remains, and comprise the principal beds of coal and salt; hence giving rise to salt springs. The organic remains in the lower secondary rocks, including the old red sandstone, carboniferous limestone, and coal formations, are chiefly vegetable; and were doubtless buried there, for the most part, by the gradual accumulation of earthy materials. It is now very generally admitted that all mineral coal, both anthracite and bituminous, was produced from vegetable matter, deposited in beds, perhaps, of former lakes, and afterwards subjected to subterranean heat. The *coal measures*, containing beds or seams of coal, consist chiefly of sandstone, and slate or shale, with ironstone, or ore; but sometimes of limestone. Above the coal formations, are the new red sandstone and magnesian limestone; the former sometimes associated with rock salt, or gypsum: next come the *lias* and *oolite*, both composed of alternating strata of clays and limestones, with some slates; the former named from its being in layers; the latter, from its containing rounded granules, like eggs: and highest among the secondary rocks are compact formations of clay, sand, and chalk, including the Weald clay, and green sand of England, containing numerous organic remains. The lower secondary rocks contain rare remains of vertebrated fishes, as the cephalaspis, (Plate IX. Fig. 6.); and some reptiles, as scorpions; but chiefly shells and plants. In the new red sandstone, are found the palæoniscus, (Fig. 7.), the plesiosaurus, (Fig. 8.), the ichthyosaurus, (Fig. 9.), and the pterodactylus, (Fig. 10.); besides some slight traces of quadrupeds and birds. In the Wealden rocks, Dr. Mantell found the remains of the iguanodon, (Fig. 11.), which in some specimens was nearly 70 feet long. The secondary rocks are often broken through, and overlaid, by unconformable masses of basalt: and, in a few instances, porphyry, and even granite, appear to have been thrown up like lava, through fissures from below.

Next above the secondary, are generally found *tertiary*, rocks, consisting of various deposites, of soft sandstone, limestone, gypsum, sand, clay, and marl; which last is chiefly a mixture of clay and carbonate of lime. These strata were apparently formed in bays, or lakes, and hence are of limited extent. The lower series contain numerous marine shells; while some of the upper contain, in a few localities, fresh-water shells, and the bones of quadrupeds and birds, often of extinct species; and these sometimes alternate with strata of marine formation. Here we find the remains of the anoplotherium, (Pl. IX. Fig. 12.), the palæotherium, (Fig. 13.), the dinotherum, (Fig. 14.), the megatherium, or megalonyx, (p. 379.), and the mastodon, or mammoth, (Fig. 16.), all of which races are now extinct. Above the tertiary formations, we find strata of gravel, sand, clay, and shells, mingled with large boulders, or rounded masses of rock, which have evidently been transported from their original position, directly or indirectly by the action of water. These strata have hence been called *diluvial;* and they contain remains of the animals last named as well as of the elephant, rhinoceros, and numerous other genera, such as now exist. Lastly, the deposites formed by the wash of rivers, the action of currents, the labors of coral animals, and similar causes, are called *alluvial;* and of course contain numerous remains, chiefly of animals and plants still living.

§ 3. Under the head of *Physical Geology*, we are to treat of the causes which have been, or now are in operation, producing changes in the structure, or aspect of the globe. These may all, it is believed, be referred to the action of wind, water, heat, or organic life. The *wind*, by transporting sand, forming hills, and burying cities or forests, becomes a geological agent worthy of notice. The action of *water*, requires to be studied both on the land, and in the ocean. On the land, it has an abrasive action, wearing away the solid earth, and transporting it to some lower region, or to the sea. This action is increased by the effect of frost; as the freezing of water in porous rocks, by its expansion, causes them to crack or scale off, and thus assists in their disintegration. The earth, on mountain sides, becoming soft by thawing, is then more easily carried away by torrents; forming avalanches, or *slides* of earth, like those of ice. Rocks are also corroded by vegetation; and this partly by the action of acids, produced from the mosses or lichens which cover them.

By such means, the loose superficial earth is believed to have been derived from solid rocks: and the *detritus*, carried away by streams, is still forming alluvial land; especially in the *deltas*, or islands and shoals, at the mouths of rivers; which are continually encroaching upon the sea. Islands may also be formed by deposition, from currents in the ocean; or by coral animals, shells, or submarine plants; and in some instances by subterranean forces, as in modern volcanoes, raising the bed of the ocean above the level of its surface. If this were done upon an extensive scale, it would account for the existence of marine shells in elevated positions; and the currents which such upheaving would produce, may account for the boulders, or rounded rocks, which we find scattered over the land, dragged from their primitive beds, and leaving stratches on the rocks over which they have passed; while beds of gravel and sand were deposited in the eddies.

The cause adequate to produce such a rise of the bed of the ocean, must be sought in the *internal fires* of the earth; whose existence is proved by more than two hundred volcanoes, still burning, as well as by the numerous hot springs, in various parts of the globe. Another proof is found in the fact, that the earth grows warmer, as we descend in caves or mines, at the rate of 1° Fahrenheit, for every 50 feet, nearly; commencing with the average temperature not far below the surface. At this rate of increase, the earth, at the depth of ten miles, would be at a red heat; at the depth of twenty miles it would be at a white heat; and at a depth of fifty miles, the hardest rocks would be in a liquid state, like melted iron or lava. Nor is this statement incredible, when we consider how cool may be the exterior of a large furnace, while the iron is melting within it. The temperature of the bottom of the ocean, is probably, nearly that of its surface; while, beneath it, the heat may increase according to the ratio above given.



Engraved by R. S. Gilbert. Phila.

The facts here stated, have led many geologists to believe that the earth was once completely melted with fervent heat; and has been gradually cooling for ages, since elephants lived in Siberia: and that the whole of the interior is still in a melted state; the central heat still remaining, while the exterior has nearly reached its limit of cooling; since no change has been recorded within the period of authentic history. Others deny the doctrine of central heat, and attribute the volcanic fires, which they suppose to be of limited extent, to chemical action, such as the burning of the alkaline metals, by contact, perhaps, with water from the sea. According to this theory, the combustion should penetrate deeper and deeper: and this refers us back to a period when the earth's surface might have been heated by external fires. Either of these theories may account for the formation of crystalline rocks, by heat and pressure; as it has been proved by experiment, that such materials may be crystallized by these causes. Either of these theories will also aid in explaining the action of earthquakes, and volcanoes; the generation and confinement of gases causing the former, till the gaseous matter finds vent in the latter, or rends new fissures, to make its escape. But farther investigations are yet required, to complete the theory of Geology, and to reconcile all the facts hitherto collected. We can only add, that the book of nature and the book of revelation will, doubtless, when fully understood, be found to agree entirely; both being the work of the same infinitely wise and omnipotent Author.

§ 4. As a specimen of *Descriptive Geology*, we have only room to give a general idea of the structure of our own country; which presents a rich field of geological investigation. It should here be understood that countries are named geologically from the strata which appear on their surface; though other formations may exist beneath. The greater part of New England, including the White and Green mountains, is of the primary formation; consisting chiefly of granitic rocks. Rhode Island, and a narrow belt to the north of it, are of the transition formation, but contain traces of coal; and the red sandstone of the Connecticut river, belongs to the secondary. The Highlands of New York, and the Blue Ridge in Virginia, are primary mountains; but the Catskill, and Alleghany range, are transition: and between these two chains lies the *Great valley*, chiefly of the secondary formation. The coal regions of Pennsylvania, Virginia, and Ohio are chiefly transition and secondary; and this latter formation prevails in New York and the Western States. Coal is found not only in eastern Ohio, but in northern Michigan, western Illinois, on the Wabash and Green rivers, and west of the Arkansas. The coast of the United States, from Long Island southward to Florida, and westward to Louisiana, is alluvial; widening towards the south. Back of this, is a belt of the tertiary formation, rich in fossil shells; and still farther back, is an upper secondary, or cretaceous formation, extending nearly to the foot of the primary mountains already referred to.

XII. DEPARTMENT:

ANDROPHYSICS.

In the department of Androphysics, we include the study of the structure and functions of the human body; the diseases and accidents to which it is exposed; and the remedies for these, so far as they have been discovered. The name is derived from the Greek ανηρ, a man, and φυσις, nature; and it may be regarded as synonymous with the appellation of *Medicine*, or the Medical Sciences, derived from the Latin *medico*, I cure; by which names this group is often referred to. In our own language, the word *physician*, has a relation to these sciences alone: whereas the French word *physicien*, is applied, as we have already intimated, only to the natural philosopher. The study of this department, presupposes a general knowledge of Natural Philosophy, and a thorough knowledge of Chemistry; on which many of its reasonings, and still more of its practical applications depend.

The study of Medicine is often ranked as an uncertain science; in contradistinction from the mathematical and acrophysical, which have received the appellation of the exact sciences. In this respect, medicine stands on a somewhat peculiar basis: for not only are its principles, derived as they must be from extensive induction, liable to be called in question; but the problems which it presents, are so complicated and embarrassed, that even when its principles are correct, there may still be an uncertainty in making their application. Granting that a given remedy is efficacious in a certain stage of a certain disease, it may nevertheless be difficult to identify the disease, and especially to determine the precise stage at which the remedy should be applied. These last remarks relate to medicine considered as an art, rather than as a science: for many of the facts and principles of Anatomy, Physiology, and even of Medicine proper, are as firmly established as any truths in the whole wide range of knowledge; though others are less certain, or still on trial: and, after all, the inherent difficulty of rightly applying them is the greatest source of error; one which we fear can never be wholly removed.

On the importance of the Medical profession; the rewards which await its successful votaries; and the responsibility which it imposes, in cases where the slightest error may prove fatal to the confiding patient; on these themes, we need not here expatiate. But we feel bound to remark, that the physician who has studied the microcosm, or little world, of the human frame, without realizing that it is the work of a Divine Architect, can hardly possess those reasoning faculties, which alone can merit success in this profession, or ensure a proper use of it when attained. The last branches of Androphysics, are among the ultimate sciences; subsidizing others, but subsidiary to none: and it thus ranks in the physical world, with Theology in the intellectual; as alike aiming to meliorate the condition of the human race. To the pious Physician, alone, it belongs, to unite these noble aims; by caring for the eternal welfare of those whose health he attempts to restore; and referring them to the great Physician of souls, for the cure of diseases far more fatal than any which his skill can remove.

The principle of life, and the connection of the soul and body, are among the greatest mysteries of nature; such as man, in his finite state, probably can never completely fathom. Hippocrates attributed animal warmth to a *material fire*, residing in the left ventricle of the heart, and moderated by the inhalation of the air; but the mind he regarded as an *ethereal fire*, immortal, and intelligent, acting on the body by means of certain faculties or powers. Plato regarded the spinal marrow as the bond of union between the soul and body: and he believed in three vital principles, residing respectively in the head, the heart, and the liver, or stomach. Galen modified this idea, and imagined the existence of three spirits, or faculties; the *animal*, residing in the brain, the source of sensation and motion; the *vital*, residing in the heart, the source of warmth and vitality; and the *natural*, residing in the liver or stomach, the source of nutrition and growth.

In modern times, Van Helmont gave the name of *archeus*, or the chief, and Boerhaave, that of *impetum faciens*, or the active energy, to the great principle of life; but without throwing any new light upon the subject. Glisson, in his work on the "Life of Nature and of its three first faculties, the perceptive, appetitive, and motive," published in 1672, first ascribed to the fibres of the animal body a peculiar power which he called *irritability*. This he divided into three kinds, natural, vital, and animal; pointing out the differences in different organs. The idea of a *nervous fluid*, as the exciting cause of muscular action, has always been a prominent one; the ancients comparing it to air; the alchemists to an acid; while Newton suggested that it might be ethereal; an opinion which was adopted by Haller and Cuvier. But although an ethereal medium, which is very probably a *galvanic current*, may be the intermediate agent in producing muscular motion; still the mind, or soul, the power which controls this mechanism, is left as inexplicable as ever. The mechanism itself may yet be farther elucidated by new discoveries: but the presiding spirit, must, we apprehend, be loosed from its earthly bondage, before it can turn and perceive the chains which bound it.

In distributing the medical sciences under their appropriate branches, we incline strongly to the opinion that Anatomy and Physiology, from their close relations, the one treating of the mechanism of the body, and the other of its uses, should both be included in one and the same branch; for which we would propose the name Andronomy; a name which, we trust, will often be found convenient to designate these subjects connectedly; with the greatest possible brevity. Pharmacy, Materia Medica, and Therapeutics, in so far as they relate to the preparation and properties of medicines, we would include in one branch, under the name of Pharmacology. The study of diseases, and their proper remedies, forms another extensive branch, usually known as the Practice of Medicine, or medicine proper, for which we would propose the name Thereology. And lastly, for Surgery, and other kindred subjects which cannot properly appear in a general classification, we would revive the term Chirurgery; as admitting of this extended signification. The subject of *Medical Jurisprudence*, being an application of the various principles of Androphysics to legal cases, of murder, suicide, wounds, or personal injuries, may be considered as an appendix to this department, rather than a distinct branch of it.

We proceed then, to give a synopsis of Androphysics, under the branches of Andronomy, Pharmacology, Thereology, and Chirurgery.

CHAPTER I.

ANDRONOMY.

In the branch of Andronomy, we comprehend the study of the numan frame, in a healthy state; or the structure and functions of its various organs, and the means by which they have been made known. The name is derived from the Greek, ανηρ, a man, and νομος, a law; hence signifying the laws of the human body, as Zoonomy does those of animals in general, and Phytonomy those of plants. *Anatomy*, so named from the Greek ανατεμνω, I dissect, or cut in pieces, relates to the *structure* of the body, or its organization; while *Physiology*, relates to the *functions* of the different organs, or their uses in supporting animal life: and both are included in the present branch, Andronomy. Human Anatomy and Physiology, have been greatly illustrated by the study of Zoonomy, or *Comparative Anatomy and Physiology*, which names have been applied to the similar study of the various animal races. The study of Andronomy is evidently indispensable to the physician and surgeon; and of high importance to the sculptor and painter: while all classes of men may profit by a knowledge of its general principles, in preserving or improving their health.

The earliest knowledge of Anatomy, probably originated in the casual exposure of skeletons, and the inspection of wounds, or diseased parts of the body. Great knowledge of this science has been attributed to the Egyptian, Thoth, called by the Greeks, Hermes; (p. 26); but as the Egyptians held in abhorrence those who dissected the human body, or even who practised embalming, their knowledge on this subject must have been very limited. In Greece, Democritus of Abdera, devoted much time to the dissection of animals; and perhaps did more for this branch than Hippocrates, his great contemporary. Plato theorized on Andronomy; but Aristotle wrote practical treatises on it, of real value, though frequently erroneous. Hippocrates spoke of the muscles merely as flesh: and confounded the nerves with the ligaments and tendons: but Aristotle confounded the nerves with the muscles; in saying that the nerves originate in the heart.

Anatomy was cultivated in Egypt, under the Ptolemies, by Herophilus and Erasistratus, the two earliest physicians who are recorded as having dissected human bodies. The former first taught osteology from the human skeleton; and traced the nerves from the brain and spinal marrow: and the latter first asserted that digestion is performed by the action of the stomach; regarding the nerves as the primary organs of sense and of motion. At length, Galen, who had been educated at Alexandria, collected the andronomical knowledge of his predecessors, in a text book, which was adopted by all civilized nations down to modern times; and especially by the Arabians, whose religion prohibited dissection, and made them depend on other sources for a knowledge of the human frame. Galen held the liver to be the origin of the veins; and the heart, of the arteries: but he has the merit of giving prominence to the doctrine of *final causes;* insisting that every organ must have its appropriate functions:—a principle which has perhaps been of greater service to Andronomy than to any other science.

In modern times, the practice of Anatomy was revived by Mondini, or Mundinus, who first made public dissections, at Bologna, in 1315; and who published a regular treatise on this science: but a far better work was produced by Vesalius, about 1550, founded on his own observations. The anatomy of the ear, was soon after investigated by Fallopius and Eustachius; and that of the eye, by Meibomius. Meanwhile, Servetus, who was burnt as a heretic, at Geneva, in 1553, had noticed the smaller circulation of the blood, between the heart and lungs: and Cæsalpinus inferred a motion of the blood in the veins, from their swelling on the application of a ligature. Silvius discovered valves in the veins, and Fabricius Aquapendente noticed that they were all turned towards the heart: but the great discovery of the general circulation of the blood, from the heart, through the arteries, and back to the heart through the veins, was first made by Harvey, in 1619; and published in 1628.

The lacteal vessels had been noticed by Eristratus, in ancient times; but they were rediscovered by Asellius, in 1622; and their use in conveying chyle into the blood, was ascertained by Pecquet, in 1651. The lymphatic vessels, were first noticed by Rudbeck, of Sweden; and their valves by Ruysch, of Holland: their use being to absorb superfluous fluids from various parts, and return the same to the blood. The injection of small blood vessels for dissection, first practised by Silvius, was greatly improved by Swammerdam; who, in 1672, used melted wax for this purpose; which, hardening as it cools, gives an exact cast of the vessels injected. Borelli was the first to show that the muscles, which in the dead body have but little strength, are capable, in the living animal, of sustaining an enormous tension; acting, as many of them do, at a great disadvantage, in producing force or motion. The gastric juice of the stomach was first noticed and examined by Boyle, and Ray: and Mayow first promulgated accurate ideas concerning the nature of respiration. Haller studied and wrote very extensively on Andronomy; and he was the first who treated Physiology as a distinct science; though his work involves all the elements of Anatomy. Haller maintained the doctrine of animal irritability, proposed by Glisson; and regarded it as a power distinct from sensation. The nomenclature of descriptive anatomy was improved by Dr. Barclay, in 1803; particularly by the introduction of terms for describing more precisely the relative positions of the parts and organs. More recently, Bichat has proposed an excellent classification of organic structures; and has made the important distinction of a cerebral, and a ganglionic system of the nerves. To Sir Charles Bell, and Mr. Mayo, we are indebted, for the discovery that the nerves are of two distinct classes, one for the exercise of volition, and the other for sensation:—a discovery which has been termed the greatest, in this branch of knowledge, since the time of Harvey.

General Anatomy, is that division of Andronomy which treats of the different kinds of structure, found in the human body, as regards the mode of organization. These *structures*, or systems, are, according to Bichat, the *osseous*, or bony, constituting the bones; the *cartilaginous*, composing the cartilage, or gristle of the joints; the *fibrous*, forming the ligaments of the joints, and the coverings of the kidneys, and other organs; the *muscular*, found in the muscles; the *vascular*, in the heart, arteries, and veins; the *nervous*, in the nerves; the *mucous*, forming the inner lining of the nose, windpipe, and other parts; the *serous*, enveloping the stomach, lungs, and other organs; the *glandular*, occurring in small rounded organs of secretion; the *adipose*, or fatty, forming the inner covering; and the *cellular*, forming the outer covering, of the kidneys, and other organs; and the *dermoid* structure, occurring in the skin. The study of the particular parts and organs of the human body, has been termed, *Special Anatomy;* and this, with the corresponding parts of Physiology, will constitute the remainder of the present branch, under the commonly received divisions of Osteology, Myology, Neurology, Angiology, and Splanchnology.

§ 1. *Osteology*, is that division of Anatomy which treats of the *bones;* their structure, shape, number, and position. Bones, are of a porous structure; the hard part consisting chiefly of carbonate and phosphate of lime; but the pores being filled with vessels and fluids, which supply the materials for their growth. When fully developed, in the human body, they are about 250 in number; and collectively they form the framework which supports the body, called, in technical language, the *skeleton*. The skeleton is generally divided into the head, trunk, and extremities. In the head, the *cranium*, or skull, is composed of eight bones, united by serrated joints, or sutures, the upper front bone being called the *sinciput*, and the hinder bone the *occiput*. The *face*, has fourteen bones, besides thirty-two *teeth;* the *incisors*, or cutting teeth being in front, four in each jaw; the *canine*, or cuspid teeth next; the *bicuspid*, or small molars, next to these; and the *molars*, or grinding teeth, completing the series, on each side. Eight small bones of the ears, might be added to the above enumeration.

The *trunk*, of the skeleton, is composed of the vertebræ, the ribs, the sternum, and the ossa innominata. The *vertebræ*, or joints, which together form the vertebral column, called the *spine*, or back bone, are twenty-four in number. The *ribs*, extending from the spine around the sides, are twelve in number on each side; of which the upper seven are called *true ribs;* and the others, being shorter, are called *false ribs.* The *sternum*, or breast bone, generally consisting of three pieces, extends vertically along the breast; and is connected by cartilages, with the ribs on each side. The *ossa innominata*, are the hip-bones; between which is the *sacrum*, a bone supporting the spine, and terminated by the *coccyx*, of a conical form.

The upper, or atlantal extremities, consist of the *clavicula*, or collar bone, in front, serving to brace back the *scapula*, or shoulder blade; which latter supports the *os humeri*, or bone of the upper arm; and to this are attached the two bones of the lower arm, the *radius* and *ulna;* the former being on the side towards the thumb. Eight bones of the *carpus*, or wrist; five of the *metacarpus*, or palm of the hand; twelve bones of the fingers; and two of the thumb; complete the list of bones in the upper extremities; thirty-two on each side. The lower or sacral extremities, consist of the *os femoris*, or thigh bone; the *patella*, or knee pan; the *tibia*, or large bone of the leg; the *fibula*, or small hinder bone of the leg; the *os calcis*, or heel bone; and six other bones of the *tarsus*, or instep; five bones of the *metatarsus*, or body of the foot; and fourteen bones of the toes; making in all, thirty bones on each side. The bones are covered with a firm membrane, called the *periosteum;* which receives, where it invests the skull, the name of *pericranium:* and the joints are lined with *cartilage* or gristle, to prevent their wearing. They are kept together by strong fibrous *ligaments*, the study of which is termed *Syndesmology;* but of which we have here no room to treat.

§ 2. *Myology*, is that division of Anatomy which treats of the *muscles*. These organs are almost entirely composed of fibres, usually of a red color, and placed side by side, but sometimes of considerable thickness; as shown in the lean part of animal flesh. They are the immediate agents, by means of which all animal motion is produced, whether of mere vitality or of volition. They act, in every case, by *contraction;* whether to expel the blood from the heart, or to move a limb: and this contraction, produced probably by the galvanic action of the nerves, is one of the mysteries of animal life. If the brain is compressed, the power of contracting the muscles, by volition, ceases; and life soon becomes extinct. The muscles constitute the fleshy part of the body; and sometimes cross over each other, or interlace; while, at other times, they pass through loops, like a cord over a pulley, in order to produce the requisite motion. Those which move the limbs, are attached to the bones, mostly near the joints, by means of *tendons* or sinews; and those on opposite sides often counterbalance each other's effects.

The muscles are classed according to the region of the body which they occupy; and they are about 527 in number; of which 257 are in pairs, and on opposite sides of the body. To describe them, would far transcend our limits; but we may observe that they are mostly named from the organs to which they belong, and the kind of motion which they are intended to produce; or from their structure, or position. Thus, those which cause the bending of the limbs, are called *flexors*, as the flexor carpi radialis, serving to bend the wrist and fore arm; while those which act to straighten the limb by their contraction, are called *extensors*, as the extensor carpi ulnaris, on the outer or upper side of the fore arm, serving to bend the hand backward. Thus too, we have the levator menti, or muscle which, by contracting, raises the chin; the orbicularis oris, serving to contract the mouth; and the rectus superior, which, by contracting, raises the eye.

§ 3. *Neurology*, is that division of Anatomy which treats of the *nerves*, and the nervous system; including the organs of sensation; among which are the eye and the ear. The *nervous system*, consists of the brain; the spinal marrow; the nerves; and the nervous ganglia. The *brain*, situated within the skull, is regarded as the immediate seat of the intellect; or the organ by means of which we perceive, feel, reason, and will. It is a soft, pulpy substance, and consists of the *cerebrum*, made up of convolutions or folds, occupying the whole upper part of the skull; the *cerebellum*, or smaller brain, occupying the lower and back part; the *pons Variolii* connecting the preceding, at the centre of the brain; and the *medulla oblongata*, or oblong marrow, extending from the pons Variolii down to the spinal marrow. These parts together are enveloped by membranes, and are sometimes called the *common sensorium*, considered as the seat of sensation and volition. The *medulla spinalis*, or spinal marrow, is a continuation of the medulla oblongata, extending down the interior of the spine, and terminating in a complex nerve called *cauda equina*.

The *nerves*, are white cords, usually consisting of bunches of filaments, often interweaving with each other, and connected by cellular tissue. All the *cerebral* and *spinal nerves*, are connected with the brain, either directly, or by means of the spinal marrow: and they are found to consist of two classes; nerves of sensation, by which the mind perceives or feels; and nerves of volition, which are connected with the muscles, and serve to produce motion: but these two kinds are generally associated, forming compound nerves. They usually proceed in pairs, branching as they diverge, towards the extremities of the body: those designed to produce motion being usually the largest. There are twelve pairs of *cerebral nerves*, proceeding directly from the brain, and chiefly distributed ever the head; and thirty pairs of *spinal nerves*, proceeding from the spinal marrow to the various parts of the body.

The *ganglionic system* consists of *ganglia*, or knots, in which several nerves unite, forming what some anatomists have termed "diminutive brains": but although these ganglia have a connexion with the nerves proceeding from the brain, and may produce sensation, they are more or less independent of volition, and hence may be called nerves of instinctive action: their use being to cause those muscular motions, of digestion, respiration, and circulation, which are necessary to the preservation of life, in sleep as well as in a conscious state. The ganglionic system, is, in fact, a collection of filaments, from every nerve in the body, meeting in the ganglia, and causing every part of the system to be affected by, or sympathize with, every other part; while the mind takes cognizance of the state of the body, or is prompted to action, by the sensations thus experienced. Hence the ganglionic system has been termed *the great sympathetic nerve.*

Of the *eye*, as the organ of sight, we have already spoken in treating of Optics. (p. 361). The internal *ear*, is hollowed out from the side of the skull; and the *membrane* of the tympanum, is stretched over the passage leading to this cavity; within which are four small bones, serving to transmit the vibrations of the air, from the membrane to the *labyrinth*, or innermost spiral chamber, whence the auditory nerve conveys the impression to the brain. The sense of *smelling*, depends on the olfactory nerves; that of *tasting*, on the nerves of the tongue, terminating in small *papillæ* or pointed protuberances; and the sense of *feeling*, is produced by nervous papillæ extending nearly to the surface of the skin. The *skin*, consists of the *cuticle*, epidermis, or scarf skin, on the exterior; the *rete mucosum*, in which the nerves terminate, and which gives the color or complexion; and the *dermis*, or true skin, which is thicker than the other layers, and is connected with the cellular membrane covering the muscles of the body.

§ 4. *Angiology*, is that division of Anatomy which treats of the *vessels*, of the human body; that is the blood vessels, lacteals, and absorbents. The *blood vessels*, are the heart, arteries, and veins; with which the lungs are so closely connected, that we shall here describe them together. The heart and lungs occupy the *thorax*, or chest; and are separated from the lower viscera by a membranous partition, called the *diaphragm*. The *heart*, formed by thick and strong muscular coatings, contains two cavities, called the *right*, and the *left ventricle*, acting as forcing pumps; below which are two other cavities, called the *right* and *left auricle*, of inferior strength. The *blood*, whose use is to nourish the body, is collected from all parts of the same, by the *veins*, and enters through the *superior* and the *inferior vena cava*, into the right auricle of the heart. From this it passes into the right ventricle, through an aperture with a valve, which does not allow it to return. This ventricle, then contracting, drives the blood, through the *pulmonary artery*, into the lungs; whence, after being acted upon by the air, it proceeds, through the *pulmonary veins*, into the left auricle, and from thence into the left ventricle of the heart, which also has a valve to prevent its turning back, in its course. This ventricle, then contracting, acts as another forcing pump, to drive out the blood, through the *aorta*, or *systemic artery*, and its numerous branches, to every part of the system.

Thus, by the alternate contraction and relaxation of the ventricles, the double circulation of the blood is maintained, first through the lungs, and then through the body. The arteries, are more deeply seated than the veins; as any accident rupturing them would be more suddenly fatal: for the external veins, receiving the blood through minute or capillary vessels, from the ends of the arteries, would discharge it more slowly. Nearly 200 arteries, or arterial branches, have received distinct names; and the veins are probably equally numerous. The *lungs*, called in brutes the lights, are two in number, and occupy the greater part of the thorax, or upper cavity: the left lung consisting of two *lobes* or divisions, and the right lung consisting of three lobes, as it is the largest. They are composed of membranous cells, which are permeable to gases, but not to the blood; and which receive the air inhaled by respiration. The blood, is a fluid, consisting of water, fibrin, serum, and various salts; and receiving its red color from small globules suspended in it, which separate when it coagulates. In the veins, it has a dark color: but after circulating through the lungs, absorbing oxygen, and giving out carbonic acid, it acquires a rich red color, and is then fitted for giving nourishment, as, by means of the arteries, it pervades the whole animal system. This absorption of oxygen by *respiration*, is necessary to animal life; and its uniting with carbon in the blood is probably one source of vital heat.

The *absorbent* vessels, are small pellucid tubes, which occur in all parts of the body, and which serve to absorb any superfluous fluids, and convey them back to the blood; thus relieving the several parts, and contributing to the general nourishment. They are mostly called *lymphatic vessels;* from their containing the *lymph* or absorbed fluid; which has a slight rose or yellow color, and which, when extracted, coagulates, like the blood. But those absorbent vessels which convey the chyle from the digested food, and pour it into the blood, are called *lacteals;* from the milk-like appearance of the chyle; although they are similar, in structure and office, to the other lymphatics. There are also *lymphatic glands*, in which several of the vessels unite, and thence discharge the lymph by a common reservoir.

§ 5. *Splanchnology*, is that division of Anatomy which treats of the *viscera*, or entrails, occupying the interior parts of the body: but we would here restrict the term to the viscera of the *abdomen*, or lower cavity of the body; excluding the lungs, which have already been described. The *stomach*, next to the liver, occupies the upper part of the abdomen; and is a strong muscular vessel, presenting, on its interior surface, small *villi*, or tubular points, for infusing the gastric juice. The masticated food, passing from the mouth into the *pharynx*, is forced, by muscular action, down the *œsophagus*, or gullet; and enters the stomach, at its left end. It is there mixed with the *gastric juice;* by the aid of which it is *digested*, or converted into a soft pulpy mass, called *chyme*. The chyme then passes from the right end of the stomach into the *duodenum*, where it receives the *bile* and *pancreatic juice;* by the action of which, a liquid, resembling milk, is produced, called *chyle:* and while traversing the *jejunum* and *ilium*, or small intestines, the chyle is absorbed by the lacteal vessels, and conveyed into the blood.

The name *Adenology*, has been applied to the study of the *glands*, or organs of secretion: but as several of these belong with the viscera, and with the organs of digestion, we shall here describe them under the present section. The *salivary glands*, are situated behind, and below, the lower jaw; and their office is to secrete the *saliva;* which serves to moisten the food, during mastication, and to aid the processes of deglutition, and digestion.

The largest of all the glands is the *liver;* which lies immediately beneath the diaphragm, mostly on the right side of the abdomen, and partly covering the stomach. It consists of three lobes; and its use is to secrete, or elaborate the *bile* or gall; a greenish, bitter fluid, which it forms from the blood, and discharges into the *gall-bladder*, whence it is conveyed to the chyme in the duodenum. The *pancreas*, called in brutes the sweetbread, is also a glandular body, situated behind the stomach, and secreting the *pancreatic juice;* which resembles saliva, and which goes with the bile, to modify the chyme, and assist in the formation of chyle, for the recruiting of the blood. The *spleen*, or milt, is a sponge-like organ, much smaller than the liver, and situated below the diaphragm, on the back and left side. It contains numerous blood-vessels, and its cells are usually filled with blood; from which some have supposed it to be a reservoir or safety vessel for the blood; but others regard it as subservient to digestion, by occasioning an increased secretion of the gastric and pancreatic juices. The *kidneys*, are small glands, whose office is to secrete or separate superfluous and noxious fluids from the blood, and discharge the same through the ureters into the bladder. If this action be prevented for a long time, as by disease, the result is fatal to the patient.

We have only room remaining to speak of *the Voice*, which can hardly be studied under any of the preceding divisions of Andronomy. The voice is produced by means of air expelled from the lungs; though imperfect sounds may also be produced during inhalation. Thus, the lungs serve the double purpose, of respiration, and of articulation, or speech. The air vessels of the lungs, unite, on leaving these viscera, in two tubes called the *bronchi*, which, ascending, also unite, to form the *trachea*, or windpipe; situated in front of the œsophagus, or gullet; which is also in front of, and attached to, the spinal column. The principal organ of the voice, is the *larynx*, at the upper end of the windpipe, opening into the pharynx, just behind the root of the tongue, and often causing, by its size, a remarkable protuberance in the front part of the neck. The larynx, owes its vocal powers to the *arytænoid cartilage;* the two opposite sides, or edges of which, when nearly closed together, are made to vibrate, like a reed, by the air passing between them. The opening which they form, is called the *glottis;* and the cartilage at the root of the tongue, which falls back, when we swallow, and thus prevents the food from entering the windpipe, is called the *epiglottis*. The part performed by the other organs of speech, has already been alluded to, in giving the classification of articulate sounds under the head of Phonology. (p. 43).

CHAPTER II.

PHARMACOLOGY.

Pharmacology, is that branch of Androphysics which treats of medicines; including the modes of preparing them; their properties; and their uses. The name is derived from the Greek φαρμακον, which may signify either a medicine or a poison: as many of the most important medicines, from their powerful action, would necessarily be poisonous to a healthy person, especially if taken in large quantities. A *medicine* may be defined as any substance applied to the animal system, either externally or internally, to cure disease, or restore health. The art of comparing and compounding medicines, is termed *Pharmacy;* the person who prepares them, an *apothecary;* the book which describes them, a *dispensatory;* and the medicines themselves, as well the study of them, are sometimes termed *Materia Medica.* The study of poisons, and their antidotes, is called *Toxicology;* and is here included in the present branch of Androphysics.

We think it proper to notice a prejudice which prevails, with many persons, against the use of any mineral substance, as an internal medicine. This prejudice supposes that all mineral substances are injurious to the system: whereas, even vegetables themselves, contain several of the mineral medicines. The human body, in a healthy state, contains salts of potassa, soda, lime, magnesia, and iron; equally powerful with the salts administered by the physician. Even our common salt, contains elements, which, when disunited, would be as virulent and noxious to swallow as almost any compound which the chemist can prepare. While, therefore, mineral medicines, as well as vegetable, may be abused, by being given too frequently, or in excess; they are, doubtless, to be ranked among the most important, and in some cases, as the only remedies, which can combat the disease, or give the least promise of recovery.

The preparation of medicines was, in the earliest times, made by the physicians themselves: but it first became a distinct branch of medical science, at Alexandria, about 400 B. C. Mantias, a pupil of Herophilus, seems to have been the author of the first systematic treatise on Pharmacology; and even kings, as Attalus of Pergamus, and Mithridates of Pontus, devoted themselves to the study and invention of medicines. Heras, of Cappadocia, appears to have written the first work on Pharmacy at Rome, 49 B. C.; and Andromachus, the physician of Nero, has left a description of the *theriaca;* an electuary, or treacle, composed of about seventy different ingredients, long famous as an antidote against poison. Dioscorides wrote a work on Materia Medica, evincing much discrimination; and Galen proposed a classification of medicines, founded, however, on his theory of temperaments, and therefore, long since discarded.

The Arabian alchemists introduced several new chemical medicines; among which were mercury and its preparations: but the principal pharmaceutical work of the middle ages, was the *Antidotarium*, published by Prapositus, of Salerno, as early as the twelfth century Paracelsus, the founder of the chemical party in medicine, published a work on the medical virtues of antimony; and brought that article into extensive use. The Dispensatory of Valerius Cordus, published in 1542, was long used as a guide in compounding medicines; but the Fundamenta Materiæ Medicæ, of the German Cartheuser, founded on the improvements then already made in botany and chemistry, introduced a new and more scientific era, in the present branch of medical knowledge. In France, this science was promoted by the labors of Chomel and Geoffroy; and in England, the treatise of Lewis, improved by Dr. Aiken, contributed much to its advancement. A superior classification of medicines has since been proposed by Dr. Young; and modified by Dr. A. T. Thompson: nor should we here omit to mention the *U. S. Pharmacopeia*, prepared by a convention of physicians, as a work of high authority; and the *Dispensatory* of Drs. Wood and Bache, as one of sterling value.

We proceed to treat of Pharmacology under the heads of Therapeutics; Materia Medica; Pharmacy, and Toxicology.

§ 1. Under the head of *Therapeutics*, we would treat of the classification of medicines, in reference to the manner in which they act, or the effects which they produce, on the human system. The classification here presented, is drawn chiefly from Dr. Dunglison's recent and valuable treatise on Therapeutics. In reference to their mode of action, medicines are classed as either vital, chemical, or mechanical agents. The *vital agents*, are those which directly affect the functions of life; acting either as excitants, which increase, or sedatives, which diminish organic action. The *chemical agents*, are those which produce an immediate chemical change, favorable to health; and the *mechanical agents*, are so called, because they are supposed to act mechanically, in producing their peculiar effects.

The *excitant medicines*, are farther subdivided into several orders, if we may use the term; according to their peculiar effects. The *stimulants*, or excitants proper, are those which transiently increase the vital action, whether locally or generally; including carminatives, or remedies against flatulence, or wind in the stomach. *Tonics*, not only excite, but permanently invigorate the system; including anthelmintics, or medicines to expel worms. *Emetics*, are medicines used to produce nausea and vomiting; and *cathartics*, are used for loosening, or cleansing the system; being called laxatives, when gradual; purgatives, when sudden; and drastics when severe, in their operation. *Diaphoretics*, or sudorifics, are used to produce perspiration; *diuretics*, to increase the secretion of the kidneys; *errhines*, to produce sneezing, or nasal secretion, sometimes relieving the head; and *expectorants*, to remove obstructions of the air passages, and of the lungs. *Sialogogues*, are medicines which increase the secretion of saliva. *Sorbefacients*, are employed to cause the absorption and removal of superfluous, or noxious fluids: *revellents*, among which are rubefacients and vesicants, producing local irritation and blisters, serve thereby to reduce the diseased action of other parts: and *antispasmodics*, on a similar principle, remove muscular contraction, by relaxing the nerves which produce it. *Astringents*, are sometimes used internally as tonics, to give strength; but more frequently as styptics, to contract the muscular fiibres, and arrest the effusion of blood.

The *sedative medicines*, include *sedatives proper*, which, acting on the nerves, or on the vascular system, diminish vital action; also *narcotics*, which first excite and then diminish nervous action, producing, in sufficient doses, lethargy or stupefaction; also *refrigerants*, which reduce morbid heat, or heat caused by disease; and finally *nauseants*, which by producing nausea, flow of saliva, and perspiration, allay morbid action. The *Chemical agents*, are *antacids*, used to counteract acidity, particularly in the stomach; *antalkalies*, used to counteract alkalinity; *antilithics*, designed to prevent, and *lithontriptics*, to remove, urinary calculus, or stone in the bladder; and *disinfectants*, used either for fumigation, to purify the air, or as antiseptics, to prevent putrefaction or mortification. The *Mechanical agents*, are *demulcents*, which sheathe sensitive parts from irritation; including emollients, which soften the parts, or render them more flexible; and *diluents*, which serve merely to dilute the animal fluids, or render them thinner and less irritating.

§ 2. To *Materia Medica*, belongs the description of all simple medicines, and their medical properties. We shall here classify them, so far as we have room to mention them, according to the order established in the preceding section. Among the stimulant medicines, may be mentioned *alcohol;* either concentrated, as in spirits of wine; or diluted, as in distilled liquors; or modified by other substances, as in wine and other fermented liquors. Next to this, are *ether; camphor;* and the essential oils, as of peppermint, or turpentine; all of which are similar compounds of carbon, hydrogen, and oxygen. *Ammonia*, and its carbonate, which latter is known as hartshorn, sal volatile, or smelling salt, are stimulant and antacid at the same time. *Mercurial medicines*, as calomel, and red precipitate, are powerful stimulants, which should be used with the greatest caution. *Heat*, electricity, and some mental emotions, may also be classed with the stimulant medicines.

Among the tonic medicines, are *cinchonia*, and *quinia*, sometimes called quinine; as also their salts; all obtained from Peruvian bark; and found to be most important remedies in certain fevers. Several *astringent barks* and roots, have tonic properties; as nutgalls, quassia, and snake root: and several *astringent salts*,—of iron, copper, and zinc,—particularly the sulphate of iron, and its carbonate found in chalybeate waters, belong to this class of medicines. Exercise, and cheerful emotions, have also a tonic effect. Among the anthelmintics, are *Carolina pink root;* and cowhage, which is the down of a tropical plant. The powder of tin, probably acts mechanically to destroy intestinal worms; but as it is often poisonous, its use can in no case be recommended.

The most common emetics, are *tartar emetic*, the double tartrate of antimony and potassa; and *ipecacuanha*, the active principle of which, called emetia, is milder than the preceding. *Lobelia*, or Indian tobacco, and sanguinaria, or blood root, have also emetic properties. Among the stronger cathartics, are *elaterium*, colocynth, gamboge, and *aloes;* but one more frequently used is *Epsom salt*, or the sulphate of magnesia. Pure *magnesia*, and its carbonate, are milder cathartics; the former being an excellent laxative. The most important vegetable cathartics, are *castor oil*, obtained from the castor bean; and rhubarb, and jalap, which are the roots of foreign plants. *Calomel*, or the protochloride of mercury, is both a purgative and anthelmintic; or, if taken in very small dose, it has general stimulant and alterative effects; like those of metallic mercury, and its oxide, in the blue pill.

Among the reputed diaphoretics, are *ipecacuanha*, and *tartar emetic*, when taken in very small quantity. The former, mixed with opium and sulphate of potassa, forms the sudorific medicine called Dover's powder. The *acetate*, and carbonate of *ammonia;* and *nitric ether*, often called sweet spirits of nitre; also produce perspiration: and better than these, in some cases, are warmth, exercise, and friction. Among the diuretics, are several salts of potassa and soda; and several vegetables; as the meadow saffron, foxglove, juniper berries, and squills. The principal errhines, are *snuff*, euphorbium, and white hellebore: and among the expectorants, we may name ammoniac, assafœtida, squills, and the *balsams of Peru* and *Tolu*. Inhalations of ammonia, vinegar, or tar, in the state of vapor, may also promote expectoration. The chief sialogogues are tobacco, horse radish, and the sweet flag; the habitual use of which is however injurious to digestion. The mercurial medicines also act as sialogogues, when taken in sufficient quantity.

Among the sorbefacient medicines, are iodine, bromine, ammoniac, and galbanum: and absorption of the fluids may also be promoted by compression, or friction. Of revellent medicines, *ammonia*, *mustard*, cayenne pepper, and Burgundy pitch, are used as rubefacients, producing local excitement or irritation. The *Spanish fly* is sometimes used as a vesicant, to raise blisters; and Croton oil, as a suppurant, producing pustules or sores. *Lunar caustic* or the nitrate of silver, and *lapis causticus*, or caustic potassa, are used as escharotics, for removing unsound flesh. Among the antispasmodics, are *castor; musk;* assafœtida; and sulphuric and nitric ethers; which exert a peculiar soothing effect on the nervous system.

Of sedative remedies proper, *venesection*, or blood-letting, is most frequently employed; though it should be with caution. The inhalation of diluted nitrogen, hydrogen, carbonic acid, or carburetted hydrogen gases, has also a sedative effect. Among the narcotics, *opium*, or its active principles, morphia and narcotina, are frequently used. *Laudanum*, is a strong tincture, or alcoholic infusion of opium; and *paregoric*, is a much weaker tincture of opium, with camphor, and other ingredients. The ethers, may have a narcotic effect, as in Hoffman's anodyne; and *hops*, and *tobacco*, are also used as narcotics, both externally, and internally. The refrigerants most employed, are cooling drinks, or cold external applications. *Nitre*, and *borax*, have also a cooling influence, in proper cases. The nauseant medicines, are chiefly emetics administered in very small doses.

Of chemical agents, the antacids are the *alkalies;* as ammonia, potassa, soda, lime, and magnesia; or their carbonates; which serve directly to neutralize acids, and prevent their injurious effect. On the other hand, the antalkalies are the *acids;* as acetic, tartaric, sulphuric, nitric, or muriatic; which however are seldom required, unless it be as stimulants, or tonics. Acids, and alkalies, are sometimes used as antilithics; but not without careful discrimination: the tonics and diuretics being perhaps preferable. The chief disinfectants, are *chlorine;* or in its place the chloride of soda, or of lime; and sulphurous, nitric, and muriatic acids, charcoal, creosote, and smoke. Of mechanical agents, in medicine, we may name as demulcents, *gum Arabic*, or gum tragacanth; *Iceland*, or *Irish moss;* flaxseed, barley, oat-meal, or starch; sassafras pith, or slippery elm bark; and olive oil, lard, or spermaceti. When the action of diluents is required, *water*, and the most simple beverages, are those generally employed.

§ 3. *Pharmacy*, or Pharmaceutics, is that division of Pharmacology which relates to the selection, preservation, and preparation of medicines; constituting the art of the apothecary. In purchasing mineral substances, it is of course highly important that they should be pure and genuine; which can only be ascertained by chemical tests. In procuring drugs from plants, botanical knowledge is also necessary, in order to identify the species, to which chemical tests would be inadequate. It is moreover important that the plants, or their parts, should have been gathered in the right season, in a sound state; and that they should have been properly preserved. In general, the best seasons for gathering medicinal plants, are the spring and autumn: but flowers should be gathered when just expanded; and aromatic herbs, when just in flower.

Among the chemical processes, employed in preparing medicines, are *sublimation*, or the conversion of a solid into vapor; *pulverization*, or the reducing of a solid to a powder; *solution*, or the dissolving of a solid in a liquid; *maceration*, or the soaking of a vegetable substance, for a long time, in a cold liquid, to dissolve some soluble principle; *digestion*, or the same process at a temperature between 90° and 100°; *decoction*, or the same process briefly conducted at a boiling heat; *distillation*, or the heating of any substance, in a retort, or close vessel, with a receiver to condense the vapors which pass over; *lixivation*, or leaching, to extract any soluble substance by means of a liquid filtering through it; *crystallization*, either by the evaporation of a liquid, or the cooling of a melted substance; and *calcination*, or the exposure of any solid to a strong heat, to expel a vaporizable ingredient.

In prescribing medicines, and preparing prescriptions, the measures used, are, for solids the *grain*, (gr.) of which 5760 make a pound Troy, and 7000 make a pound avoirdupois; the *scruple*, (℈), or 20 grains; the *drachm*, (ʒ), which is three scruples, or 60 grains; and the *ounce*, (℥), which is 8 drachms, or 480 grains: the ounce and pound of apothecaries' being the same as those of Troy weight, but differently subdivided. For liquids, the *wine gallon*, (c), is divided into eight *pints*, (o), of 28.875 cubic inches each; so that a pint of distilled water, at 60°, weighs precisely 7289.7 grains. The pint, is divided into 16 *fluidounces*, (*f*℥); each of these into 8 *fluidrachms*, (*f*ʒ); and the fluidrachm contains 60 *minims*, (m); of which, therefore, 480 make one fluidounce.

§ 4. *Toxicology*, is the study of poisons; their effects, and their antidotes. These should be understood not only by the physician, but also by the apothecary, who may often be called on directly to furnish a remedy. A *poison*, is any substance which, applied to the bod , will destroy life; and the remedy for it is called its *antidote*. Some substances are poisonous when applied externally, being absorbed into the system: some gases are poisonous to inhale; and indeed, no gas except pure atmospheric air, can be considered as entirely healthy: but the poisons which most frequently prove fatal, are those taken into the stomach; sometimes by mistake; but at other times administered with criminal designs. For these, the first best remedy, if at hand, is their immediate extraction by the stomach pump; to be followed by vigorous curative measures, under medical direction.

The antidote for *arsenic*, is freshly precipitated peroxide of iron, speedily administered: that for *antimony*, or its preparations, is tannin, gall nuts, or Peruvian bark; that for *sugar of lead*, Epsom or Glauber's salt; and for *corrosive sublimate*, and the salts of *copper*, the best antidote is the white of eggs, swallowed in a raw state. For *oxalic acid*, the antidote is lime water, or powdered chalk; for *Prussic* or *hydrocyanic acid*, liquid ammonia, or chloride of soda, if it can be administered before it be too late; and for other *strong acids*, the best antidote is magnesia, or the carbonates of potassa, soda, magnesia, or lime. For *alkalies*, as caustic ammonia, potassa or soda, the best antidotes are fixed oils, or vinegar, or lemon juice. When any *acid gases* have been inhaled, the best antidote is the cautious inhalation of ammonia; but for *sulphuretted hydrogen*, the cautious inhalation of dilute chlorine is recommended; and for *chlorine* itself, the inhalation of vapor of ammonia or ether. For *ammonia*, taken into the lungs, perhaps the fumes of vinegar would be the best antidote.

For most of the *vegetable poisons*, containing an alkaline principle, the best antidotes yet discovered are chlorine, iodine, or bromine; which act by neutralizing or decomposing the poisonous principle. As morphia, quinia, ipecacuanha, and other vegetable alkalies form sparingly soluble salts with iodic acid, perhaps this would be found a beneficial application, when they are taken in excess. Tannin, or infusion of gall nuts, is also found to have a beneficial effect, in some cases of vegetable poisoning, particularly as an antidote for *opium*, and its proximate principles. For poisoning by the *bite* or *sting of animals*, strong ammonia, and chloride of soda, are among the best antidotes; but if the wound be severe, a ligature should be immediately applied to the part affected, to prevent the poison from circulating; and, if possible, the poison should be withdrawn by suction, or the poisoned part cut away. In slight cases, common salt, or ammonia, in solution, is often successfully employed.

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CHAPTER III.

THEREOLOGY.

In the branch of Thereology, we include the study of diseases, and the practice of medicine. The name is derived from the Greek, θερεω, I cure, or take care of; and hence it may be applied to the means of preventing, as well as of removing disease. We make it therefore to comprehend the subjects of *Hygienics*, or the means of preserving health; *Nosology*, or the classification of diseases; *Pathology*, or their anatomical and physiological effects; *Etiology*, or their causes; *Symptomatology*, or their symptoms; and *Clinics*, or the Practice of Medicine, as the name implies, at the bedside of the patient. The term *prognostics*, is applied to those symptoms which indicate the causes or probable event of diseases; and *diagnostics*, to those symptoms which distinguish a disease from other similar ones. The *Institutes* of *Medicine*, a term of somewhat indefinite meaning, but applied to the physiological, pathological, therapeutic, and hygienic relations of medicine, belongs partly to this, and partly to the preceding branch of Androphysics: but as the term *Medicine*, is often applied to all the branches of this department, as well as to the remedies themselves, we have selected for the present branch what appears to us a definite and unexceptionable name.

The Egyptians attributed the invention of Medicine to Thoth, the Hermes of the Greeks; but the Greeks ascribed this invention to Chiron the centaur, and his pupil Æsculapius; who probably lived about 1260 B. C. Æsculapius is said to have first practised bleeding; and Melampus, probably his contemporary, to have introduced the use of purgatives: but these remedies are also said to have been employed in Egypt, more than 200 years earlier. The practice of Medicine in Greece, was for ages confined to the descendants of Æsculapius; and from his name, Asclepias in Greek, they were called Asclepiades; being also prophets and priests at the shrine of their deified ancestor. While Pythagoras attempted to explain diseases by his mystic numbers, or planetary influences; Democritus, by his theory of atoms, and a vacuum; and Heraclitus, by his ideas of ethers and elements; it was left for Hippocrates, one of the Asclepiades, to establish the practice of medicine on rational principles, of experiment and observation. Hippocrates, however, believed in four constitutional temperaments; the *sanguineous*, *phlegmatic*, *choleric* or bilious, and *melancholic;* according to the predominance of blood, phlegm, yellow bile, or black bile, which he supposed to be the four principal humors.

The successors of Hippocrates, combining his doctrines with those of the Platonic philosophy, founded the *dogmatic* school in medicine; which flourished at Alexandria, and often substituted wild speculations for facts and experience. In opposition to this, Herophilus, and his adherents, founded the *empiric* school; which professed to be guided by experience alone. The *methodic* school, originated at Rome, with Asclepiades of Bithynia, or Themison, his disciple; and founded its practice on the principle of either bracing or relaxing the system. The *eclectic* school, supported by Aretæus and Celsus, professed to select and combine the excellences of the others: and this is also called the *pneumatic* school, from its admitting the existence of a fifth element, air or spirit. By these different sects, the practice of medicine was thrown into complete confusion, until *Galen* of Pergamus appeared, and breaking through the restraints of system, revived the principles of Hippocrates, with such arguments and improvements, as fixed a standard of practice, and gave him almost absolute authority, as a physician, down to modern times. The Arabians paid much attention to this branch of knowledge; and Avicenna wrote a work, entitled Canons of Medicine, chiefly a compilation from Galen and the other classic writers, which was used, to some extent, in the schools of Europe.

The earliest *medical school*, of importance, in Christian Europe, was that of Salerno, founded probably as early as A. D. 900, and well established in 1143. It gave a new impulse to this science; and aided in preserving the ancient medical classics. With the revival of letters, the Greek writers came into general use; until the time of Paracelsus: who boasted of intercourse with spirits, and professed to have discovered the elixir of life. Van Helmont adopted the views of Paracelsus; but Sylvius proposed a new theory, maintaining that all animal action results from fermentation; a theory which was partly adopted by Sydenham in England. To these mystical and chemical theories succeed that of the *pneumaticians*, headed by Stahl; who attributed the origin of all diseases to the mind, considered as acting on the body, and ordinarily preserving the fluids in a healthy state. On the other hand the *mechanicians*, as they were called, commencing with Borelli and Bellini, regarded the body as a complex hydraulic machine; while Baglivi and Hoffman, founders of the *dynamic* sect, attributed disease to either excessive or deficient nervous and muscular action; producing in the one case spasms, in the other, atony or weakness. The errors of these different theories, are now too evident to require our farther notice.

Meanwhile, the knowledge of practical medicine was enlarged by the introduction of new, and especially chemical remedies; and by the appearance of new diseases. The small-pox and the measles were first described by the Arabians; and the leprosy was spread in Europe by the Crusades. An infirmary for the plague, was established at Venice, in 1423. With the discovery of distant regions, and the repetition of long voyages, the scurvy first made its appearance: and a remarkable disease, called the sweating sickness, first broke out among the English forces returning from France, in 1483. The use of Peruvian or Jesuit's bark, in fevers, dates back to 1639; and inoculation for the small-pox was introduced from Turkey into England, by Lady Montague, in 1722. The milder practice of vaccination, was brought into vogue by the writings of Dr. Jenner in 1798.

Among the more recent physicians who have promulged new views of medicine, we may mention Dr. Cullen, whose classification of diseases has been extensively referred to; Dr. Brown, from whom was named the Brunonian theory, that all disease results from excess or deficiency of excitement; Dr. Darwin, who taught, in his Zoonomia, that all organic life results from, or consists in, living, irritable filaments; and Dr. Good, who has given a new and unique classification of diseases, in his work, on the study of Medicine. In France, the new doctrine of Broussais, that all febrile diseases originate in inflammation of the mucous membrane of the alimentary canal, has found its votaries: and in Germany, the *homœopathic* system of Hahnemann, maintaining that all diseases may be cured by producing similar artificial diseases, of transient duration, and with extremely small doses of medicine, has attracted much attention, notwithstanding its extravagance. We may add that *animal magnetism*, originally proposed by Mesmer, has been recently revived as a means of cure, by a supposed sympathctic effect upon the nerves, communicated from the operator to the patient. These various innovations have been useful in promoting new researches, but none of them has ever been generally and implicitly received; and the *eclectic* principle, of selecting the good from all systems, and rejecting the rest, has been the guide of modern physicians.*

We proceed to treat of Thereology, under the heads of Hygienics; and Febrile, Eruptive, Nervous, and Secretive diseases.

§ 1. *Hygienics*, we have already defined as that division of Thereology which relates to the preservation of health. Among the conditions on which it depends, are diet, exercise, air, temperature, clothing, occupation, rest, habits, and passions. The consideration of *diet*, or the quantity and quality of food, is so important that it has sometimes been regarded as a distinct study, under the name of *Dietetics*. The structure of the teeth, and other organs, indicates that animal as well as vegetable food is the proper diet of mankind; and experience has shown that animal food is generally the most nutritious, but vegetable food is the most easily digested, and that which should be the most freely used. The name *aliment*, is applied to substantial articles of food; and the substances used for flavor or seasoning, are called *condiments*. Of course both the food and drink should be wholesome, taken at proper intervals, and never in excess.

Of animal substances, *jelly* is the most easily digested; and next to this, *fibrin*, or muscular flesh; while fat, or oily matter, is less digestible, and should therefore be taken sparingly. *Milk* and *eggs*, containing albumen, are moderately digestible, but the latter should not be cooked hard. The common *scaly fish*, when properly cooked, are of easy digestion; and *oysters* much more so than other shell fish. *Salted meat*, and fish, are best adapted to stronger stomachs, of persons accustomed to vigorous exercise. Of vegetable substances, *gluten*, contained in wheat, rye, peas, and beans, is quite nutritive

* The school of the *arithmeticians*, founded very recently by Baron Louis, proposes to improve medicine by a strict analysis of symptoms, and a rigid investigation of organic lesions; and thus, by a close adherence to the numerical results, to ascertain the *essential* qualities of every disease. The same method is also applied to the treatment.

and digestible; and the same may be said of *starch*, which abounds in all kinds of grain, and especially in rice and the potato, as well as in sago and arrowroot. *Fruits*, containing mucilage, as the melon; or sugar, as the grape; or acids, as the apple; are healthy and digestible, if taken when ripe, and in moderate quantities. *Sweetmeats*, spices, and other stimulants, tend to weaken the digestive organs; and should therefore be taken sparingly.

Besides receiving nourishment, the vital organs require to be stimulated by frequent, but not too violent *exercise*. This is best taken, when the weather permits, in the open air; and the greatest care should be taken by all persons to breathe a *pure and fresh air;* as being absolutely necessary to vivify the blood, and to preserve the system in a healthy state. A due degree of moisture, in the air, so that it be not too damp, is also favorable to health. Extreme, or sudden changes of *temperature*, should be avoided; especially after exercising, or when in a state of debility; lest the perspiration should be checked, and colds, coughs, fever, or consumption ensue. For the same reason, the *clothing* should be properly regulated, and *cleanliness* be carefully attended to; as essential to a healthy cutaneous action. Regular intervals of *rest* and *sleep*, are also among the requisites of long continued health. In general, those *occupations* are the most healthy, which furnish due exercise both to the body and mind, in a pure atmosphere, and with moderate exposure. Regular and cheerful *habits*, are highly conducive to health and longevity; but the indulgence of violent and exhausting *passions*, frequently causes disease, and aggravates it when otherwise produced. On some of these points we have already spoken, and more fully, in treating of Physical Education. (p. 93.)

§ 2. We come now to the study of diseases; commencing with *Febrile Diseases*, as forming the most numerous and important division. They are classed as *Pyrexiæ*, or inflammatory diseases, by Cullen; and as *Hæmatica*, or sanguineous diseases, by Good; and are generally characterized by chilliness at the commencement, followed by preternatural heat, and acceleration of the pulse, denoting an irritated state of the system. The *Febres*, or fevers proper, are called *intermittent*, when they return at stated intervals; as quotidian, returning every day; tertian, returning every other day, or every third day, inclusive; and quartan, returning every fourth day, or with intervals of two entire days; these returns being followed by stages of perspiration, and of ague, or chilliness. Fevers are called *remittent*, when, although continued, they present periodical abatement; as the bilious, or gastric fever, connected with derangement of the liver and alimentary canal; and the yellow fever, very similar to the bilious, but often more violent, and less remittent. *Continuous* fevers, are those which have no marked abatement; as the synochal, or inflammatory fever, with strong pulse; and the typhus fever, characterized by great debility, and a morbid state of the animal fluids.

The second division of febrile diseases, consists of the *Phlegmasiæ*, or inflammations; usually manifesting themselves locally, or in some particular part; though accompanied by general irritation, probably from a diseased state of the blood. Among these diseases, are *phrenitis*, or inflammation of the brain; *glossitis*, or inflammation of the tongue; *tonsillitis*, of the tonsils, commonly called quinsy; *parotitis*, called also the mumps, an inflammation of the parotid gland; *laryngitis*, or inflammation of the larynx; *trachitis*, of the trachea, or windpipe; *bronchitis*, of the bronchi; and *pneumonitis*, or pneumonia, an inflammation of the lungs. These latter diseases often commence with a catarrh, or cold, and may terminate in *phthisis*, or consumption.* To the phlegmasiæ also belong *gastritis*, or inflammation of the mucous membrane of the stomach; *enteritis*, or similar inflammation of the bowels, which, when acute, is termed *dysentery*, but when caused by irritation, with but slight fever, is called *diarrhœa; hepatitis*, or inflammation of the liver; *splenitis*, of the spleen; *nephritis*, of the kidneys; and *cystitis*, of the bladder.

To these diseases, we may add *rheumatism*, or inflammation of the muscles and tendons; and *arthritis*, podagra, or gout, characterized by inflammation in the joints of the feet and hands. *Ophthalmia*, or inflammation of the eyes; and *otitis*, of the internal ear, are the last of the phlegmasiæ, which we have room to name. The treatment of these diseases, of course, varies with their causes and symptoms; but it consists generally, in removing obstructions, by cathartic medicines; reducing the febrile action, if necessary, by blood-letting; and otherwise soothing and relaxing the parts affected, so that they may be restored to their proper state, and enabled to resume their functions in a healthy manner.

§ 3. Under the head of *Eruptive Diseases*, we would comprehend those disorders which, though usually accompanied by fever, are characterized by cutaneous eruptions; and hence termed *Exanthemata*, in several systems of Nosology. Of this class of diseases are the oriental *plague*, and the *variola*, or small pox; diseases which have, in times past, made such fearful ravages among mankind. The *varicella*, or chicken pox; the *vaccinia*, or cow pox; and other varioloid affections, come next in this class; after which we would name *rubeola*, or the measles; *scarlatina*, or scarlet fever; and *erysipelas*, or St. Anthony's fire; all attended with eruptions of the skin. These diseases, though febrile, are regarded as of a specific character, or produced by special causes; and they are generally contagious. The mode of treating them, is of course, similar to that of fevers proper; and consists in arresting dangerous action, if possible; and watching the disease, until it has run its course.

The minor Exanthemata, or eruptive diseases, comprise the different forms of *herpes*, or tetter; as the ringworm, and shingles, distinguished by an assemblage of small ulcers; also *pemphigus*, or vesicular fever, producing small blister-like eruptions; *urticaria*, or nettle rash, with smarting blotches; *miliaria*, or miliary fever, with small white vesicles, resembling millet seed; *erythema*, with red spots on the skin; *roseola*, or rosy rash, affecting the skin with rose-

* Several of them are comprehended under the designation of *cynanche*, or sore throat.

colored spots; and *purpura*, in which the spots are of a livid or purple color. In this class of diseases may be placed boils, (or biles), termed by some writers *phlogosis;* and, perhaps, the *paronychia*, or whitlow; though this may be caused by local injury, followed by inflammation.

In this division of medicine, we may place the diseases termed *Hæmorrhagiæ*, or effusions of blood; which, though not eruptive diseases in a technical sense, are yet placed next to them by most nosologists, and partake, at least, of their febrile character. They are, in fact, an *eruption* of the blood; sometimes owing to an irritated state of the capillary vessels, in which the blood passes from the arteries to the veins; and sometimes caused by the rupture of a blood vessel. Among these diseases are *epistaxis*, or bleeding of the nose; *hæmoptisis*, or spitting of blood from the lungs; *hæmatemesis*, or vomiting of blood from the stomach; *hæmaturia*, or sanguineous effusion from the bladder; and *hæmorrhois*, or piles, with sanguineous discharges from the bowels. Organic diseases of the heart, might, we think, here find their proper place. The treatment, in most of these cases, must have a reference to their locality; and consists in relieving the blood vessels, if necessary, and strengthening the parts affected.

§ 3. Under the head of *Nervous Diseases*, we include those disorders, termed by Cullen, *Neuroses*, in which the nervous system is more immediately affected; whether originally, or by sympathy; and whether the mind be disordered thereby, or not. First, among these diseases, we would place the *Adynamiæ*, or diseases resulting from nervous debility; as *apoplexy*, or sudden and continued failure of the powers of sense and motion; *paralysis*, or loss of sensation and motion in only a part of the body; *catalepsy*, or a temporary suspension of consciousness, without lethargy or spasms; and *syncope*, or fainting, with deficient circulation and respiration during the swoon: to which we may add *anorexia*, or failure of appetite; *dyspepsia*, or indigestion, often attended with *hypochondriasis*, or languid melancholy; *aphonia*, or loss of the voice; *amarosis*, or gutta serena, consisting in paralysis of the optic nerve; *cophosis*, or failure of hearing; and similar diseases, arising from weakness, or suspension, of the nervous functions. *Dementia*, or wandering of the mind; and *amentia*, or idiotism, also belong, we think, to this group of diseases.

Next, among the nervous diseases, we place the *Erethismi;* in which the nerves are irritated, or their sensibility increased. These include *agrypnia*, or watchfulness, through nervous excitement; and *oneirodynia*, or the incubus, or night mare, consisting in a sense of oppression, during sleep; to which we may add *bulimia*, or preternatural hunger; and *pica*, or appetite for unnatural food. In this class we may also comprehend *Neuralgia*, or local pains in the nerves; as *cephalagia*, or headache; *prosophalgia*, or faceache; *otalgia*, or earache; *odontalgia*, or toothache; *gastrodynia*, or pain in the stomach; and *pleurodynia*, or pain in the side. These diseases are produced, sometimes by local injury to the nerves, and sometimes by miasmata, or other causes. In the latter case, relief is often obtained from tonic medicines; but in the former case, recourse is sometimes had to dividing the nerves.

The last class of nervous diseases, *Spasmi*, or spasmodic affections, includes *mania*, or violent madness; *epilepsy*, or the falling sickness, with sudden insensibility, and convulsions; *chorea*, or St. Vitus's dance, with frequent convulsive motions of the limbs; *raphania*, or cripple disease, with spasms of the joints; *hysteria*, or hysterics, affecting the whole nervous system; *tetanus*, or spasmodic rigidity of the body, including *trismus*, or the locked jaw; and *hydrophobia*, caused by the bite of a rabid animal, but characterized by dread and loathing of water. In this class of diseases, we may also place *asthma*, or difficult respiration at intervals, with cough and stricture across the breast; *dyspnœa*, or difficult respiration, and cough, without a sense of pressure; *pertussis*, or whooping cough; *asphyxia*, or suspended animation, as by suffocation or drowning; *angina pectoris*, or spasms of the chest, usually caused by some disease of the heart; *colic*, or spasmodic pains in the abdomen, usually caused by irritation of the stomach or bowels; and *cholera*, or spasmodic vomitings and purgings, probably caused by derangement of the liver.

§ 5. In our last division, *Secretive Diseases*, we would include various disorders of the absorbent, secretive, and assimilative functions; affecting different parts of the system. To this class belong most of the *Epischeses*, or suppressions, and the *Apocenoses*, or fluxes, so named by Dr. Cullen. Of the former, are *icterus*, or jaundice, caused by retention of the bile; and *constipation*, or costiveness; and of the latter kind, are *ptyalismus*, or flow of saliva; *ephidrosis*, or excessive perspiration; and *diabetes*, or excessive secretions of the kidneys. Here also we would mention the *hydrops*, or dropsy, attended with watery swellings; as *hydrocephalus*, or dropsy of the brain; *hydrothorax*, or dropsy of the chest; *ascites*, or dropsy of the abdomen; and *anasarca*, or dropsy of the skin or cellular system. These diseases are said to be best counteracted by venesection and powerful cathartics.

Last, in this class of diseases, we would place a part of the *Cachexiæ*, of Cullen, attributable to morbid humors; as *scrofula*, or king's evil, producing external tumors and ulcerations; *scorbutus*, or scurvy, with spongy gums, debility, tumors, and ulcers; *elephantiasis*, producing swollen limbs, and a rough, wrinkled skin; *lepra*, or leprosy, producing dry scaly patches on the skin; *psora*, or the itch, produced by small insects penetrating the skin; *tinea*, or scald head, causing ulcers and scabs at the root of the hair; and *plica*, or trichoma, a disease in which the blood flows from the hair; all of which might have been classed with eruptive diseases, but are not usually attended with sensible inflammation. *Bronchocele*, or the goitre, producing a large tumor in the throat; *scirrhus*, or a hard glandular tumor, often resulting in a cancer; *exostosis*, a tumor or morbid enlargement of a bone; and *caries*, or decay of the bones, are the last diseases which we have room here to name; reserving for Surgery the mention of those which are curable chiefly by surgical operations.

CHAPTER IV.

CHIRURGERY.

UNDER the former name of Chirurgery, we would comprise all that branch of Androphysics which relates to manual operations for medical purposes; including Surgery, as at present defined, and other subordinate subjects. The name is derived from the Greek, χειρ, the hand; and εργον, a work or operation; and the word *Surgery*, may be traced to the same original. It relates chiefly to the treatment of wounds, fractures, dislocations or sprains, tumors, ulcers, and such deformities as can be removed by mechanical means; but for these purposes, it presupposes a general knowledge of Medicine, and a thorough knowledge of Anatomy, both to perform the operations aright, and to administer the proper means of recovery from their effects. The practice of Surgery, requires the utmost firmness, self-possession, skill, and dexterity; without which, the more critical operations, where life hangs upon a single touch, should not be attempted.

The practice of Surgery, doubtless commenced with the dressing of wounds, caused by accident, or inflicted in war. It is related that Chiron, and his disciple Æsculapius, accompanied the Argonautic expedition, to take care of the wounded and sick; and that this office was performed, during the Trojan war, by Machaon and Podalirius, the sons of Æsculapius. The Greek and Roman physicians practised both medicine and surgery, as far as then known; though the latter branch began to be treated separately, as early as 300 B. C. Hippocrates practised blood-letting, with the lancet; trepanning, for injuries of the brain; and cauterizing, for the removal of ulcers. Celsus invented ligatures, for wounded arteries; amputation, for gangrened limbs; couching, for cataract in the eye; the use of cupping-glasses, for drawing blood by scarification; and a mode of lithotomy, still called the Celsian operation. Galen wrote on ruptures, and bandages; and Paulus Ægineta, who flourished A. D. 640, and invented bronchotomy, wrote the last classic work of merit on this science.

Among the Arabians, Avenzoar, and Albucasis wrote briefly on Surgery; but this art was practised chiefly by women and slaves. In Christendom, it was practised by the monks, till A. D. 1163; when this avocation was prohibited to them, by the Council of Tours; on the plea that the church abhorred all bloodshed. Surgery was then given over to the barbers; and degenerated to mere blood-letting, and bandaging of wounds, with minor empirical operations. The first English work on this art, was written by Gilbert Anglicus, about the year 1300; and this was followed by the French work of Chauliac, and the Latin one of Vidius: but it was not until 1585, that Ambrose Paré, who styled himself barber-surgeon, profiting by the new anatomical discoveries, wrote a work on Surgery, which greatly assisted in raising this branch to its proper station in the department of Androphysics. The later works of Fabricius Aquapendente in Italy, and Hildanus in Germany, also contributed to this effect; and especially the founding of a Surgical Academy in France, in 1731.

In later times, a host of distinguished surgeons has arisen, whom we have not room here even to name. Paré, we should have added, revived the Celsian invention of ligatures for wounded arteries, instead of cauterizing them; and Desault has again revived this practice, when fallen into disuse. Petit is celebrated as the inventor of the screw tourniquet, for compressing the arteries; by which the danger from amputations is greatly diminished. More recently, Desault has enriched surgery with various improvements; and he was the first clinical lecturer on this branch of medical knowledge. In England, surgery was greatly neglected, till the publication of Wiseman's treatises, in 1676: but it has since profited by the labors of Chesselden, celebrated for his practical skill; of Alexander Monro, who studied the pathology of surgery; of John Hunter, who wrote on inflammation, and gunshot wounds; and of John Bell, who also wrote on wounds, and improved the means of taking up arteries, in difficult cases of aneurism.

We proceed to offer some illustrations of this branch of Androphysics, under the heads of Vulnar, Normal, and Topical Surgery.

§ 1. Under the head of *Vulnar Surgery*, we comprise the treatment of external injuries; as wounds, fractures, and dislocations, in all their various forms. To this section belongs the process of *blood-letting;* which, though beneficial in many diseases, is itself a surgical operation, producing one or more wounds, which require surgical attention. The diseases for which this process is remedial, are most frequently those in which there is plethora, or fulness of blood; or which are accompanied by inflammation. The method usually employed, is the drawing of blood from a vein: called also *phlebotomy*, or venesection. The veins, being more superficial in the body than the arteries, are more accessible; and as they convey the blood from capillary vessels back to the heart, there is less danger from them, of excessive bleeding. In using the *lancet*, in this process, the greatest care must be taken, neither to wound an artery, which might be fatal, through loss of blood, or might produce a dangerous aneurism; nor to wound a nerve, which might eventually cause convulsions, equally dangerous. The other modes of blood-letting, are scarification, or *cupping*, where many small punctures are made at once, and the cupping-glass applied, having a syringe for exhausting the air, and thus increasing the flow of blood; and *leeching*, or the extraction of blood by the application of leeches, often called bloodsuckers.

The stoppage of blood, when flowing by hemorrhage, or from bruises or wounds, may often be effected by some simple application; as of adhesive plaster, lint, flour, or agaric, or an astringent. If these do not succeed, the application of pressure is necessary, either by a common bandage, or by means of the *tourniquet*, which is a bandage that can be tightened by turning a screw. When applied to a wounded artery, it should be placed on the side towards the heart, from which the blood is flowing. When an artery is completely divided, the ends contract spontaneously into the cellular tissue, and the coagulated blood may prevent farther bleeding; but with the risk of ulceration. Hence, a badly wounded artery should if possible be taken up on both sides, and secured by ligatures, that the wound may heal. A great object, in these cases, is to avoid inflammation; or, if produced, to allay it, by bleeding, and laxatives; or to bring it to a healing suppuration. Should gangrene, or mortification ensue, as when the wounded arteries fail to nourish the limb, the last resort is *amputation*, or the cutting off of the part affected.

Wounds, are either *incised wounds*, inflicted by a sharp cutting instrument, without injury to the surrounding parts; or *contused wounds*, as punctures, lacerations and gunshot wounds, in which the surrounding parts are bruised and injured. The dressing of wounds, requires that the blood should be stanched, and the large arteries secured; after which, the wound is washed, the sides approximated, and held together, by narrow strips of adhesive plaster, with openings between; or, if necessary, by more powerful bandages, or sutures. When the wound is slight, and the parts heal immediately, they are said to unite by the *first intent:* otherwise suppuration follows, with a discharge of pus, or fluid matter. Contused wounds, or *bruises*, and especially punctured wounds, or *stabs*, are often more dangerous than cuts; as the bruised and deadened parts must be removed by suppuration, before the wound can heal. The application of a poultice; the allaying of inflammation, by reduced diet, and blood-letting if necessary; and entire rest and composure, with opiates, if required, to allay extreme pain; are among the best remedial measures.

In case of the *dislocation* of a limb, the bone should be restored to its place; and in the case of a *fracture*, the broken parts require to be carefully readjusted to each other, and kept in their position by proper fixtures and bandages. A thorough knowledge of Anatomy, is of course requisite, to detect fractures or dislocations, and readjust the parts; which, in some cases, requires the application of powerful forces. When the skull is fractured, the broken parts are frequently forced inward, and exert a pressure on the brain; which must be relieved as speedily as possible, or the insensibility which it produces will soon result in death. The last resort in this case, and in other cases of like pressure, is *trepanning*, or cutting a circular piece out of the skull. The instrument employed, is a cylindrical saw, turning like an auger, but with teeth set around one end of it: and it is called a trepan, or *trephine*. This operation should generally be followed by blood-letting; to diminish the subsequent inflammation of the brain.

§ 2. Under the head of *Normal Surgery*, we would treat of those operations which are necessary to promote recovery from ordinary diseases; or to remedy malformations; excepting diseases or malformations of the eye, the ear, and the teeth, which are reserved for the following section. The word *normal*, from the Latin *norma*, a rule, is here used in reference to the regular action of the organs, or the proper shape and state of the parts, on which it is intended to act.

To this section belongs the treatment of *hernia*, or rupture ; in which some of the viscera are protruded from their natural cavity ; producing tumors, and sometimes dangerous consequences. This disease may often be cured by a truss, exerting mechanical pressure, to keep the parts in place. Here also we may speak of tumors of the blood vessels ; as *aneurism*, or the unnatural enlargement of an artery in some part ; and *varix*, or varicose aneurism, which is the similar enlargement of a vein. Aneurism is generally best cured by passing a ligature around the artery ; which is thus obliterated, and the wound allowed to heal. *Ecchymosis*, is the effusion of blood, from a vein or artery, into the surrounding cellular tissue: but this blood is, in general, easily absorbed and removed.

Abscesses, or swellings, usually result from, or are connected with, inflammation : and they sometimes require to be opened with a sharp instrument, to remove the purulent matter, or to allay pain. If they cannot be removed by friction, or cooling applications, at an early stage, then suppuration is necessary to their cure ; and they are then called *ulcers*. A sore which remains for a long time without either healing or spreading, is called an indolent or callous ulcer; but one which continues to spread and corrode the flesh is called a malignant or phagadenic ulcer; of which class is the *cancer*. Ulcers, unless produced by wounds or bruises, indicate a morbid or indolent state of the system : and they require various treatment ; either soothing, as by poultices, lint, and cooling applications ; or stimulating, as by mercurial or styptic applications ; or sometimes they require cauterizing, either with escharotics or the actual cautery. The *moxa*, used as a cautery, is made of cotton, immersed in a solution of nitre, then rolled up in a small mass, and when dry, burnt in contact with the part which is to be cauterized. When ulcers heal by a healthy action, they are said to *granulate;* the forming of new flesh being termed granulation.

To this division of Surgery, also belongs the treatment of *malformations;* or natural defects and deformities, which admit of surgical remedies. Many of these can be obliterated by proper operations; especially if attended to in the vigor of youth, when nature exerts the greatest recuperative power. Among them, we would mention curvature of the spine; and especially *loxarthrus*, or club-foot, consisting in an irregular growth or developement, and hence an unnatural shape, of that important member. The application of pressure, by preventing the growth in a wrong direction, and promoting it in a right one, is among the remedies proposed for this deformity.

§ 3. Under the head of *Topical Surgery*, we would comprise the surgical treatment of diseases of the eye, the ear, and the teeth; which, from their difficulty, and importance, have been separated, in large cities, from general surgery, and assigned respectively to the Oculist, the Aurist, and the Dentist. The diseases of the eye, requiring the attention of the *Oculist*, are numerous, and sometimes difficult to discover. Among them, is *ophthalmia*, or inflammation of the eye, farther distinguished according to the part most affected ; also *hydrophthalmia*, or dropsy of the eye ; *albugo*, or leucoma, that is opacity of the cornea; *cataract*, or opacity of the crystalline lens; *glaucoma*, or disease of the vitreous humor; and *amaurosis*, or gutta serena, a disease of the retina, or optic nerve. Albugo, and cataract, may be removed; the former by a careful application of nitrate of silver, at intervals; and the latter, either by extraction, or by the operation of *couching;* which consists in pushing the crystalline lens aside, so that it shall not interfere with regular vision.

The diseases of the ear, the care of which belongs to the *Aurist*, are less numerous than those of the eye; but, like them, often require surgical operations. The introduction of foreign substances into the ear, sometimes thoughtlessly effected by children, may cause serious injury, and deafness, unless speedily removed. When insects penetrate the ear, they may be killed by dropping in olive oil, or a decoction of tobacco; and they may then be removed, like other substances, by syringing, or by means of the forceps, or probe. Deafness may also be produced either by too abundant, or too scanty secretion of *cerumen*, or wax of the ear; and when this aggregates and hardens, it may be softened by means of olive oil.

To the *Dentist*, belongs that division of Surgery which relates to operations on the teeth. The *teeth*, are organized substances, containing nerves, and vessels, by means of which they grow: and the pressure of these vessels, when swollen, causes the very common complaint of *odontalgia*, or toothache; which sometimes results from injury or decay of the teeth, and sometimes from inflammation, as in colds or fevers. Hence, toothache is often removed by subduing the inflammation: but when it is *chronic*, or long continued, it indicates exposure or disease of the nerves; and when the teeth are decayed beyond repairing, the last resort is their removal. Teeth often decay from injury to the *enamel;* which is a peculiar coating, protecting the sensitive parts; and which being gradually supplied, is not easily restored where it is once worn or broken through. Young persons should be cautioned against biting hard or rough substances, lest they suffer severely for this imprudence in after life; and, for a like reason, we prefer prepared chalk, as a *dentifrice*, in habitually cleansing the teeth, and removing acid matter, rather than charcoal, which may injure the enamel.

FOURTH PROVINCE;

TECHNOLOGY.

In the province of Technology, is here included the study of the Physical Arts; or those which relate to material objects, and result from the physical constitution of the human race. The name is derived from the Greek, τεχνη, an art, or trade; and λογος, a word, or discourse: and although the term has been sometimes applied in a more limited sense, to the mere mechanic arts, we feel entirely justified, from its convenience and propriety, in giving it the extension here proposed. We comprehend in this province, the departments of *Architechnics*, or the arts of Construction and Communication; *Chreotechnics*, or Agriculture, Manufactures, and Commerce; *Machetechnics*, or the Arts of War; and *Callotechnics*, or the Fine Arts, in a limited sense; exclusive of Poetry and Romance, which have formed the basis of a preceding department. The reasons for this arrangement have already been given, in the introduction to the present work; (pp. 34—36); with the distinction between the Sciences and Arts; and the reasons why they have not been uniformly separated, in the present classification. The claims of Technology, as here defined, may, we think, be easily vindicated, to constitute one of the four great provinces of human knowledge; the relative importance of which has never been more highly estimated than at the present day.

XIII. DEPARTMENT:

ARCHITECHNICS.

In the department of Architechnics, we include the study of the Arts of Construction, and Communication or Convection; that is of building and conveyance; comprehending, of course, the requisite preliminary information. The name is derived from the Greek, αρχος, chief; and τεχνη, an art; being suggested by the name of Architecture, one of its prominent branches; though, perhaps, sufficiently appropriate, aside from this consideration. It naturally comprehends the study of the materials used in the arts, which may be termed Hylurgy; the construction of preparatory apparatus, or Machinery; and the kindred branches of Architecture; Civil Engineering, or Viatecture; Ship Building, or Navitecture; and the management of vessels, or Navigation, including Seamanship.

The study of materials and machinery, including the application of mechanical forces, belongs in some degree to all the departments of Technology: but as they find in this department some of their most important uses, and must therefore, be studied here, at least in part, we have chosen to include them generally, as introductory branches of Architechnics; referring back to them, in the subsequent parts of the work, whenever there shall be occasion. We might have considered these subjects as merely contingent to other branches; and have treated of each kind of material or machine, only when speaking of its application: but as the same article is often used for various purposes, the description of it would still, in many cases, have been separated from the account of its use; while many important principles, relating to materials and machines in general, would thus have been entirely neglected.

The arts of construction, and of conveyance, are among those which have highly contributed to the intellectual advancement of our race; and which have, therefore, received much attention from both scientific men and statesmen. The modern improvements in public and private edifices, especially in regard to warming and ventilation, have provided new facilities for the elevated pursuits of science, and safer depositories for its accumulated stores; while public halls have become more comfortable and attractive resorts, for those who seek instruction or amusement. As knowledge has thus been accumulated at central points, the numerous means of conveyance and communication, provided by ancient and modern art, have furnished the necessary channels for its general diffusion and circulation; often reflecting back new and fresh supplies to the original sources. Considered in this point of view, the arts of Commerce and Printing might be associated with the present group, as powerful means of diffusing useful knowledge: but on account of other relations and dependences, those arts are reserved for the subsequent departments.

We have here spoken of the intellectual utility of the arts of construction and conveyance; from which their favorable influence on morals, might, we think, be justly inferred: but their immediate importance to the physical comfort and well-being of our race, is much more obvious, if not more certain. The improvements in architecture, above referred to, have doubtless contributed essentially to the general improvement in health, and corresponding decrease in the bills of mortality, exhibited in modern statistics; while the improvements in conveyance, have greatly stimulated commercial pursuits, and thus furnished greater supplies of desirable commodities; besides enlarging the personal intercourse, and with it the social relations, of the various branches of the human family. That there are drawbacks to these advantages, we must, indeed, admit, in the increasing opportunities for crime, and temptations to luxury and vice; but most reluctantly should we believe that these drawbacks could ever countervail the positive benefits already adverted to.

The arts embraced in the present department, depend, generally, like most of the following branches of Technology, on the principles of Acrophysics, or Natural Philosophy and Chemistry. Accordingly, they have been mostly classed by Dr. Ure, in his Philosophy of Manufactures, under the divisions of *Mechanical*, and *Chemical Arts*. Were these arts intermingled with the sciences on which they depend, this principle of classification would become a necessary one; although it would separate processes which are closely connected in their practice and application. But since, in the present work, we have adopted the plan of separating the physical arts from the physical sciences, in order that the principles peculiar to each may be examined in their natural connection; we here, for a similar reason, adopt the method of treating the arts, rather in reference to their general uses and objects, than to the scientific principles on which they depend. These principles we suppose to have been previously studied; and they may then be easily referred to, in treating of Technology, as often as they are called in question.

The history of Architechnics, will be more naturally distributed under its different branches: but we may here remark how rapidly most of these arts have been improved in modern times. The ancients were not entirely unacquainted with machinery; though their ponderous structures appear to have been raised, chiefly, at a great sacrifice, by unaided human force. They made roads, and even canals; though without locks to overcome inclinations of the ground: and they built ships, some of which were of great size; though generally they were small, and their voyages confined to the coasts, lest they should lose themselves in venturing more widely. But it was reserved for modern science, to apply the *magnetic needle*, to guide the beclouded mariner, over trackless seas, to worlds before unknown; and to invent the *steam engine*, driving the rapid wheel along the iron road, or through the billowy deep; instinct with life and motion; performing the labor and relieving the toils of thousands of horses;

yet governed by a touch of the hand; by which a vapor, light as smoke, is revolutionizing the world. That these great results are due to physical science, it were vain to deny; and well has art repaid the debt, by procuring for mankind the leisure to study science more profoundly, while seeking every channel for ameliorating the condition of the human race.

We proceed to treat of Architechnics, under the branches of Hylurgy; Machinery; Architecture; Civil Engineering, or Viatecture: Ship Building, or Navitecture; and Navigation, including Seamanship.

CHAPTER I.

HYLURGY.

We propose the term Hylurgy, to include the study of the various materials used in the arts, and of those elementary processes, for preparing and working them, which belong to no particular art, but are of general application. The name is derived from the Greek, ὑλη, matter, or any material; and ουργια, work: and it was suggested by the term *Metallurgy*, signifying the working of metals, which is of course included in this branch, at least so far as regards its elementary processes. The other classes of materials, which are here studied, are, as regards their origin, either earthy, vegetable, or animal; and the present study relates to their selection, properties and qualities; their strength, and durability, or preservation; their uses, and their preparation. These subjects have been made the themes of large volumes; and they are deemed sufficiently important to merit a place, as constituting a distinct, introductory branch of the arts.

Vitruvius, one of the earliest writers on Architecture, treats at large of the materials used in building, as a part of that branch; and in this he has been followed by several later writers. But the same description of materials would apply, for the most part, equally well to Civil Engineering, and Fortification; and as regards the use of wood, to Ship Building and various other arts. Hence, the propriety of separating these subjects, and forming them into a distinct branch, will, we trust, be fully evident. Among the leading topics which this branch should embrace, we will here mention Mining, Metallurgy, and Smithery, as belonging chiefly to the metals; Quarrying, Brickmaking, Masonry, and Stonecutting, as belonging chiefly to earthy materials; and Forestwork, Carpentry, and Joinery, relating chiefly to wood; to which may be added various minor subjects, not belonging immediately to special manufactures; since these latter are reserved for the next department of the arts. The important topic of the strength of materials, may properly form the subject of a distinct and concluding section of Hylurgy.

The history of the materials used in the arts, is, as might be expected, quite obscure. Vulcan is reputed to have been the first blacksmith; and some writers have supposed this personage to have been the Tubal Cain, mentioned in the Scripture, as the instructor of every artificer in brass and iron, long before the Deluge. Ithonus, of Thessaly, is said to have been the first who melted the metals, and coined money; that is, as we must limit the tradition, the first among the Greeks. Iron is said to have been discovered accidentally, by the burning of Mount Ida, 1406 B. C.; but the early mention of it in the Scriptures, above quoted, shows that this could not have been its first discovery; though it is generally admitted that gold, silver, and copper were the metals first known. The brass and copper mines of Cyprus, were discovered by Cinyra; and the iron mines of Crete are said, by Hesiod, to have been discovered by the Dactyli, or priests of Cybele. The other metals, known to the ancients, have already been referred to, under Chemistry; (p. 370); but we may here add that the *brass* spoken of in Scripture, was probably, for the most part, *bronze;* or an alloy of copper with tin, rather than zinc. Masonry, perhaps of a simple kind, was practised at least as early as at the building of the Tower of Babel; and the walls of Babylon, like the present houses in the east, were made of bricks unburnt, but dried in the sun.

If we may judge from the progress of the arts among savage nations, the working of stone would naturally precede that of the metals: and not only might rude edifices be built of them; but rude instruments could be formed of them, for cutting wood, and for domestic uses. The employment of leaves, vegetable fibres, and skins of animals, for clothing, was probably the first application of Hylurgy; and next to this, the use of stones, bark, and wood, for constructing shelters, and procuring warmth. The invention of carpentry, was attributed by the Greeks to Dædalus: but this art must have been practised at a much earlier period; that, for instance, of the building of the Ark, which sheltered the patriarchal family from the deluge. In modern times, the progress of scientific discovery has not only suggested new uses for materials already known; but it has added various other materials to the list, and furnished new supplies, where the former ones seemed almost exhausted.

Some of these substances we are now to mention, under the heads of Metallic materials; Earthy materials; and Organic materials: and a section on the strength of Materials, will conclude the branch of Hylurgy.

§ 1. Of the *Metallic Materials* used in the arts, on which something has already been said in the branch of Chemistry, a few prominent examples must here suffice. Of all the known metals, *iron* is the most useful; and its ores, particularly the oxides, are the most abundantly diffused. From its great strength, and its property of *welding*, or uniting with another piece of iron, by hammering at a white heat, it serves many purposes for which no other metal could be employed. Although hard of itself, it is rendered much harder by combining it with charcoal, as in cast iron, or *steel;* and then *tempering* it, by sudden cooling. Next to iron, in importance, is *copper;* the only metal, except titanium, which has a red color. It is, like iron, quite malleable and ductile; and hence much used in rolled sheets, to cover ships, and roofs, and form various utensils.

When used for cooking, it should be *tinned* over; as its rust and salts are poisonous. *Tin*, is a white metal, which produces a peculiar crackling sound when bent. It is used sparingly, for coating iron or copper; and for forming, with copper, *bell-metal* and *bronze*. *Lead*, is a heavy, but soft, bluish metal, easily tarnished, and, like tin, easily melted. It is poisonous internally; but there are few substances which will dissolve it: and it is much used for covering roofs and cisterns, and forming water pipes. *Zinc*, is a hard and brittle metal; though ductile when hot; and melting at a heat below redness. With copper, it forms *brass*, and *pinchbeck*.

Metallurgy, properly comprises the reducing of the metals from their ores, and the elementary processes of working them. Most of the metals are obtained from their oxides, sulphurets, or chlorides, by *smelting;* that is by heating them with charcoal, or coke, and adding sometimes a flux, as of lime, or sand, to react upon the ores, and fuse them. The charcoal combines with the oxygen, and thus separates the metal; which, in most cases, runs down, and is drawn out from the furnace. The sulphurets and chlorides, by *roasting*, or heating in the air, are converted into oxides; and then reduced as above explained. The furnaces used, are either *draught furnaces*, which burn by the natural draught; or *blast furnaces*, into which the air is driven by bellows, or by machinery. *Reverberatory furnaces*, have arched roofs, to reflect the flame back upon the ores. Among the processes of working iron, are *casting*, from the impure melted iron first obtained; *forging*, or purifying cast iron, which is brittle, and hammering it into wrought iron, which is malleable; *rolling* and *drawing* wrought iron into sheets, bars or wire; and the converting of iron into steel, by combining it with a due portion of carbon. The worker in rough iron is called a *blacksmith:* but the filing and polishing of iron or steel is the work of the *whitesmith;* and the worker in lead is called a *plumber*.

The art of *Mining*, or procuring metallic ores, mineral coal, and rock salt, from *mines* dug in the earth, supposes a knowledge of Geology, and often requires the aid of Machinery and Civil Engineering. Mines, are worked, either by sinking a *shaft*, or pit, like a well, and drawing up the materials, by means of a wheel and axle, or other machinery; or, when lying beneath a considerable slope, they are entered by tunnels; commencing, externally, on the level of the bottom of the mine, or lower, in order to draw off the water which may infiltrate. The minerals sought, lie sometimes in veins; but oftener in beds, or in successive thin strata; requiring the removal of much superfluous matter. The occurrence of a *fault*, where the beds are broken across, and one part raised above the other, often perplexes the miner, and interrupts the work.

§ 2. The *Earthy Materials*, used in the arts, are principally stones, clay, sand, and lime; used chiefly for building. In this relation, stones may be classified as either *calcareous*, containing lime, or its metallic base; or *siliceous*, containing sand or silicic acid. Of calcareous stones, the most important is *marble*, which is simply crystallized limestone; it being easy to cut, and in mild climates sufficiently durable, though gradually disintegrated by frost. *Gypsum*, or sulphate of lime, may also be used for building; but it is much softer than marble, and found in less abundance. Of silicious stones, *granite* is the most valuable for building; being sufficiently hard and strong, and very durable. Basalt, and hornblende, are much harder, and of rarer occurrence; but *sienitic granite*, and *sienite*, containing hornblende, are very useful and durable, though hard to cut. *Gneiss*, and especially *mica slate*, are highly useful for flagstones; on account of their splitting in thin layers. *Sandstone*, also called freestone, is more easily wrought, but less durable; and *argillite*, or clay slate, is chiefly used for covering roofs, and as a material for writing. *Steatite*, or soapstone, is valuable for resisting the effects of fire. To these and other similar materials, some reference has already been made, under the branches of Mineralogy and Geology. The *quarrying* of stones, is analogous to mining: but quarries are generally open to the sky; and the stones are loosened by drilling holes, and either splitting the rock with wedges, or blasting with gunpowder.

Clay, a hydrous silicate of alumina, is extensively used in *brick-making*, as well as in pottery. Bricks, are made of well kneaded clay, struck in moulds of proper shape and size, then thoroughly dried in the sun, and afterwards burnt, to give them the requisite hardness. *Lime*, is obtained by calcining marble, limestone, chalk, or shells, to drive off the carbonic acid. Pure lime slakes freely, and swells greatly by the absorption of water; hence it is also called *fat lime;* but mortar made of it does not harden under water. *Hydraulic lime*, contains alumina, silex, iron, or some other impurity; which makes it hard to slake, but causes it to harden under water, and thus to form what is called *hydraulic mortar.* Common sand may be used with hydraulic lime, to form this mortar; or it may be formed of common lime with burnt clay, or bricks finely pulverized, which constitute what may be called a hydraulic base. *Common mortar*, contains from two to four parts of sand, to one of lime.

Masonry, is the art of building with stones or bricks, and mortar; or it is the structure itself thus built. When laid without mortar, it is called dry, or *open masonry;* to distinguish it from mortar masonry. The stones, or bricks, should always be laid with their upper and lower surfaces *horizontal*, except in arches. When the stones are laid without any regular order, they form *rubble masonry:* but when in horizontal courses, they form *coursed masonry;* and when the vertical joints are also regular, they constitute *ashlar masonry.* A *header*, is a stone laid crosswise in the wall; and a *stretcher*, is one laid lengthwise; the bottom of a stone being called the *bed*, and the top, the *build.* Masonry is strongest, when the stones *break joints:* the vertical joint, in one course, coming over or under the middle of a stone, above or below. The art of *Stone cutting*, rests on principles of Geometry, which we have no room here to apply.

§ 3. Of the *Vegetable Materials*, used in the arts, the most important are, the different kinds of wood, obtained from the trunks of trees; and vegetable fibres, used for making cloth and cordage. Of *animal* materials, we shall have no room here to treat. The most important kinds of wood, are the oak and pine. The *oak*, of the genus of plants called *quercus*, is hard, heavy, strong, and durable; particularly the white oak, and live oak; which are the species most used in ship building. The *pine*, or genus *pinus*, is softer, and more easily wrought; and, from its straightness, is generally used for the masts of vessels. The *spruce*, and *cedar*, resemble pine, in their properties and uses: the *ash*, is elastic and fissile; the *elm*, and *hickory*, are tough and strong, but less durable when exposed; and the *maple*, and *black walnut*, are used for furniture, as substitutes for mahogany. *Chesnut*, and *hemlock* or Canada spruce, are used for fences and coarse purposes; and the bark of the hemlock and oak is used for tanning leather. Trees, after *felling*, or cutting, require to be seasoned, or freed from the sap, by drying, before they are used for building. *Water seasoning*, consists in laying the wood for some time under water; in order that the fermenting juices may be dissolved out, before drying: and timber is also rendered more durable, by saturation with corrosive sublimate, or blue vitriol; as proved by Mr. Kyan, and others.

Carpentry, is the art of working in timber and boards, in framing and covering buildings; though the covering, and especially the internal finishing, is distinctly called *joinery*. Timber, after being hewed, or sawed, into a proper shape, is framed, when the pieces form an angle with each other, by cutting *mortices*, or cavities, and *tenons* or projections, fitting closely together. When the timbers are at right angles, *braces* are required, extending obliquely across, from one to the other, to prevent the joints from springing. The great principle in *framing*, is, to arrange the timbers in triangles; so that each side becomes a brace to the other two. A piece of timber which acts by pushing, or resisting compression, is called a *strut;* and one which acts by drawing, or tension, is called a *tie*. Timber may be lengthened, by uniting two or more pieces endwise; either by *splicing*, or, as when they are notched into each other, by *scarfing*. Thick boards are called *planks;* and small timber is called *scantling*.

§ 4. The *Strength of Materials*, is ascertained, primarily, by *experiments* on each different kind: but when, by trials on specimens of various dimensions, the law of variation is found, the strength of other pieces, of the same kind, may be approximately determined by *calculation*. When any material is drawn asunder lengthwise, the strain which it undergoes, is called *tensive:* when it is crushed lengthwise, as may happen to a column, the strain is *compressive:* when broken crosswise, the strain is *transverse;* and when fractured by twisting, the strain is called *torsive*. Hence, to resist these different kinds of strain, there are required four corresponding kinds of strength; which may take the same names as the kinds of strain or force which they resist. It is remarkable that oak is stronger than iron, for equal *weights* of the two materials.

The *tensive strength*, is directly proportional to the cross section; without regard to the length. A bar of wrought iron, one inch square, will sustain about 65,000 lbs. of tension; and a like sized bar of oak, will require about 14,000 lbs., to draw it asunder. The *compressive strength* of a post, is nearly proportional to the greater side, into the square of the lesser, divided by the square root of the length. A cubic block of wrought iron, each side of which is one inch long, will bear a pressure of about 17,000 lbs.; and a like cube of oak, will bear about 5,000 lbs., before crushing. The *transverse strength*, of a horizontal beam, is proportional to the breadth, into the square of the depth, divided by the length. The *torsive strength*, is nearly proportional to the cube of the diameter, divided by the square root of the length. These formulæ are only approximations; and reference should always be had, as far as possible, to experiments on the same materials, and masses of nearly the same dimensions.

The manufacture of chemical articles, as the alkalies, acids, and various salts; and the preparation of paints and dye stuffs, on a large scale; would probably find its most appropriate place, in our arrangement, as an appendix to Hylurgy.

CHAPTER II.

MACHINERY.

In the branch of Machinery, we would comprehend the application of the moving forces used in the arts, such as water, wind, and steam power; and the construction of machines in general, so far as it may be considered to form a distinct class of arts. The name *machine*, is of French extraction; but derived originally from the Greek, μηχανη, having the same signification. The construction and management of machinery, has, at the present day, become so extensive and technical, as, in our opinion, to require its separation from the science of Mechanics, and its location as a distinct branch of the arts; depending, of course, on the principles of Mechanics and Hylurgy; with special reference, also, to the objects for which machines are constructed. Although subservient to Civil Engineering, Manufactures, and various other arts, most machines have so much similarity of construction, and are so often compared or contrasted, that a connected study of them seems necessary to a full course of Technology.

A *machine*, may be defined as a structure serving to produce, or to regulate motion; and to apply it to some special purpose in the arts: the object, in general, being a saving of time, or of force. Machines are applied, for accumulating power, as in the tilt hammer, and pile engine;—for regulating power, as in the fly wheel, and governor;—for increasing the velocity, as in the turning lathe, and carding machine;—for increasing the pressure, or tension, as in the lever, and other simple mechanical powers;—for prolonging the action of a power, as in the clock, and watch;—for registering operations, as in the gas-meter, and anemometer;—and for performing delicate operations, more accurately than can be done by the hand alone, as in graduating machines, for dividing scales and circles, or in machines for card-setting, dye-engraving, and coining. Machines do not *create* power; but they serve as vehicles, or agents, by means of which it is applied: and whatever is gained by them, in the increase of pressure, or tension, is compensated for by the consequent loss of velocity. Generally, machines are employed to transmit motion; but in the case of presses, and in some other instances, their object is merely to maintain a continued pressure, or tension.

The simpler forms of machinery, known to the ancients, have already been referred to under the branch of Mechanics; and their warlike machines will be reserved for the department of Machetechnics. Machines for grinding grain, were, doubtless, of very early invention; and the *hand-mill* is referred to in the New Testament. The upper stone was, in later times, attached to a shaft, and turned by oxen or asses. The invention of mills, has been ascribed to Myles of Sparta, and to Pilumnus, one of the gods of Rome: but they were certainly known, at an earlier period, to the oriental nations. *Water-mills*, were invented about the time of Mithridates; near whose residence one was built: and floating water-mills, or tide mills, were constructed by Belisarius, when the Goths stopped the Roman aqueducts, A. D. 536. *Wind-mills*, are said to have been invented in the time of Augustus; but they were first introduced into central Europe, by the Crusaders, about the year 1100. *Saw-mills*, are said to have existed in Germany as early as A. D. 350; but more certain mention is made of them at Augsburgh, in 1322. *Paper-mills*, are said to have been invented in the 14th century.

The elastic power of *steam*, was known to Hero of Alexandria; who applied it to produce the rotation of a hollow sphere, about 120 B. C. The invention of the *steam engine*, has been ascribed to Garay in Spain, in 1543; to Mathesius of Germany, in 1560; to Branca of Italy, in 1629; to Solomon de Caus, of France, in 1615; to the Marquis of Worcester, in 1663; and to Denis Papin of France, in 1690: but none of their inventions deserves the name of a steam engine; though they may have illustrated its principles. The first available application of steam power, was made in 1698, by Savery of England; whose apparatus would more properly be called a *steam pump*. It was not till 1705, that the first steam engine, properly so called, was invented by Newcomen, a blacksmith of Dartmouth. It was an *atmospheric* engine; the pressure of steam indirectly raising the piston, and the pressure of the atmosphere driving it down, when the steam was condensed.

Newcomen's engine was greatly improved by the addition of the safety valve, invented by Papin; and of the self-acting valve rods, contrived by Humphrey Potter; by which the engine was made to work itself, while he found time to play. This engine suffered an enormous waste of heat, by the cooling of the cylinder at each stroke; to remedy which was the object of James Watts's great improvement, in using a separate condenser. This was invented in 1763, but patented in 1769, to Watt and Roebuck, afterwards Watt and Bolton. By this invention, and by the application of the crank, to enable it to produce rotary motion, the steam engine has become that powerful agent in the arts which it is at the present day. The use of *high* *pressure engines*, at least in England, commenced with Messrs. Trevithick and Vivian, in 1802; of which more will be said under Viatecture, in treating of locomotives; and under Navitecture, in relation to steamboats. The present water, wind, and steam power of Great Britain, are estimated to perform the labor of more than twenty millions of men.

Our farther remarks on Machinery will be arranged under the heads of Elements of Machinery; Water power; Wind, and Animal power; and Steam power.

§ 1. The *Elements of Machinery*, include, besides the simple mechanical powers, and the theory of forces, already referred to under the branch of Mechanics, the various means of changing the direction and application of forces; and the classification of machines. Motion, in machinery, is either *continuous*, or *alternate*, that is alternately in opposite directions. Continuous motion, on the earth's surface, can only be circular, or curvilinear, unless by a succession of matter, as in a running stream: but alternate or reciprocating motion may be either *curvilinear*, or *rectilinear*, that is either in a curve, or in a straight line. *Rotary*, or circular motion, is transmitted from one axle to another, by *band wheels*, one of which is turned by the friction of the band around them both; or by *rag wheels*, having projections, and surrounded by a chain instead of a band; or by *cog wheels*, the teeth of which interlock; or by the *perpetual screw*, acting on a cog wheel; or by a *universal joint*, directly connecting the axles; or by *double cranks*, with two connecting rods, from the cranks on one axle, to those on the other. The axle of large wheels is often called the *shaft;* and when two unequal wheels gear together, the smaller is sometimes called a *pinion*.

Rotary motion may be made to produce alternate motion, by means of *cams*, or eccentric and irregular wheels, pressing on levers; and especially by means of *cranks*. Rectilinear motion may be made to produce circular, by acting on a circumference; as in the *rack*, or toothed bar, acting on a wheel; or in the unwinding of a cord; or in the motion of windmills and water wheels. Alternate motion may be changed from circular to rectilinear, or the reverse, by means of a *belt* passing over a *segment* of a circle; or by a vibrating crank and connecting rod. Alternate motion may be converted into continuous, by *ratchet wheels*, and catches; or by *scapements*, as in clocks and watches. The engaging and disengaging of machinery, is performed, in the case of cogwheels, by moving one of them backward or forward in the direction of the axle; in band wheels, by having live and dead pulleys, the latter turning separate from the axle; and in other cases, by means of attaching pins, or separable levers, or connecting rods. Machines may be classified, according to the kind of power employed, as wind mills, hand mills, steam mills; or according to the nature of the process, as grist mills, saw mills, fulling mills; or according to the material operated upon, as flour mills, sugar mills, and oil mills. On this subject we have no room to dwell.

§ 2. *Water Power*, is generally applied by means of wheels, with floats or buckets, in striking which, the water turns the wheel.

Water wheels, turning on a horizontal axis, are distinguished as overshot, undershot, or breast wheels. The *overshot wheel*, receives the water at, or near its top ; and is turned by the pressure of the water, descending by the force of gravity. In practice, it is capable of raising as much water as is employed in turning it, to about three-fourths of the height of the wheel ; and the velocity of the circumference should be between two and five feet per second. The *undershot wheel*, receives the water near its lowest part; and is turned by the impulse, or momentum, which the water already has on striking it. It will raise an equal quantity of water to only one-third of the height through which the water that turns it would have to fall, to acquire the velocity with which it strikes the wheel. The *breast wheel*, receives the water at some intermediate height; and the float boards move nearly in contact with a surrounding enclosure called an *apron*, so that the water can descend only by turning the wheel. It is intermediate between the preceding kinds, in its power; and is best suited for moderate falls, not sufficiently high for an overshot wheel.

For great heights, and a small supply of water, the *chain wheel* is sometimes used, consisting of an endless chain, passing continually around two rag wheels, at the top and bottom ; and hung with buckets, which, receiving the water near the top, descend on one side of the circuit by its pressure. The *horizontal wheel*, is occasionally used, with a vertical shaft, and oblique floats around its circumference, at the foot. When these floats are placed within a hollow cylinder, receiving the water from above, it is called a *tub wheel*. In several of these forms, the effect may be much diminished by the resistance of *back water*, remaining at the foot of the wheel. *Tide mills*, are usually undershot wheels ; resting on boats, moored in the current ; and turned by the tide.

§ 3. *Wind Power*, is still occasionally used, in those localities where water power is wanting ; although so uncertain in its continuance, that its use is necessarily limited. It is ordinarily obtained by means of the *vertical windmill*, turning on a horizontal axis, and having arms with oblique sails, revolving in a vertical plane. In this case, the sails should make an angle of only about 20 degrees, with the weather, or plane of rotation ; that is, an angle of about 70° with the axis ; and the axis should be capable of turning around horizontally, as the wind shifts, in order that it may act in whatever direction the wind blows. The *Horizontal windmill*, turns on a vertical axis, and has its sails so arranged that they may catch the wind and draw, during one-half of the revolution, but not during the other. Windmills are used for grinding grain ; but oftener for pumping water, either in salt works, or for draining.

Animal power, is necessarily used more frequently than any other kind; that of men, oxen, and horses, being the most generally employed. Where mere physical force is required, that of oxen, or horses, is preferable, from its being cheaper ; but where strength must be combined with skill, or applied on a small scale, that of man is alone available. The most favourable application of human strength, is in drawing, rather than pushing ; and it is greatest when the joints, or limbs, are nearly straightened, as at the close of the stroke in pulling at an oar. An ordinary man is said to be capable of raising 6000 lbs. at the rate of one foot per minute, during 8 hours per day. The measure of a *horse's power*, according to Mr. Watt, is, that he can raise 33,000 lbs. at the rate of one foot per minute, during 8 hours per day.

§ 4. The application of *Steam Power*, depends on principles of mechanics and calorics, to which we have already referred; and it now remains to describe the *steam engine*. The *boiler*, for generating steam, is usually made of sheet iron, in a cylindrical form; and with its gauges and safety valve, is rather a necessary appendage to the engine, than a part of the engine itself. The steam from the boiler, flows through the *steam pipe*, when the supply valve or throttle valve is opened, into one end of the *cylinder;* where it acts upon the *piston*, and presses it to the opposite end of the cylinder; from which part the previous steam, or air, is allowed to escape. The steam being then admitted into this end of the cylinder, and let off from the other, drives back the piston, and thus causes it to move alternately forward, and backward, in the cylinder. The admission, and escape of the steam, is regulated by means of the *steam*, and *exhausting valves;* which are so connected, by rods, or levers, with other moving parts, that they are mechanically opened, and shut, at the proper time. The *piston rod*, connecting the piston with the *working beam*, or with the *crank rod*, transmits the motion to the axle, in order to produce circular motion, either directly, or by means of the working beam.

In some *high pressure engines*,—especially for locomotives,—the steam is let off into the air, or goes to create a draught through the fire: and in such engines, the motion of the piston is constantly resisted by the atmospheric pressure; but in the Watts, or *condensing engine*, the steam escapes into a *condenser*, or separate cylinder, kept cold by an influx of cold water, through the condensing valve; by means of which, the steam is almost immediately condensed, and its pressure on one side of the piston, in a great measure removed. The water resulting from this condensation, is exhausted from the cylinder, by the *air pump;* and thrown into what is called the *hot well*. This hot water is carried back to the boiler, by means of the *hot water pump;* and the condenser stands in what is called the *cold well*, supplied by what is termed the *cold water pump*, to assist in keeping it cool. The rotary motion of the axle, is equalized, where this is desirable, by means of a heavy *fly wheel;* the momentum of which keeps up the motion at the *dead points* of the crank: and the velocity may be regulated by means of a *governor*, consisting of heavy balls suspended from levers, on each side of a vertical axis; and which, by flying off farther from the axle, if the velocity be increased, act on other levers, which at once diminish the supply of steam.

CHAPTER III.

ARCHITECTURE.

Architecture, in a general sense, denotes the whole art of building; but the term is now usually restricted to what was formerly called *Civil Architecture;* or the building of dwellings and other edifices for civil purposes, with all their subordinate arrangements. The name is derived from the Greek, αρχος, chief; and τεκτων, builder; or from αρχιτεκτονια, the term by which this art was known among the Greeks. The building of ships, is sometimes called Naval Architecture; and that of fortifications, Military Architecture: but these subjects are now generally regarded as distinct branches, and seldom called by these relative names. Architecture is occasionally spoken of, in reference to its ornamental parts, as one of the Fine Arts: but though it involves ornamental forms, and principles of taste, it is still, in the main, an art of construction, ranking even higher in utility, than in beauty and sublimity. The practice of this art, presupposes a knowledge of Geometry, of Mechanics, and of Hylurgy; and requires a sound judgment, correct taste, and practical skill and experience, for its successful prosecution.

As Architecture is one of the most useful, so is it one of the most ancient, among the arts. The earliest habitations of mankind were probably caverns, tents, rude cabins, and bowers of trees. From these, may have originated the four principal *styles* of Architecture, which have prevailed in the world; the Egyptian, or Hindoo; the Chinese, or Tartar; the Classic; and the Gothic. The Egyptian and Hindoo styles, appear to be the most ancient; but their origin is lost in remote antiquity. They have since given way to the lighter style of the Arabs, and Tartars; introduced, by conquest, into Hindoostan and China. The use of *unburnt bricks*, may doubtless be traced back to the building of Babel and Babylon; and the invention of *tents*, for dwellings, is ascribed in the Mosaic Scriptures to Jabal, the son of Lamech, long before the Deluge.

The Grecian style of building, appears to have originated with the *Doric order;* the oldest specimen of which was the temple of Juno at Argos, built about 1400 B. C., under the reign of Dorus. The *Ionic order*, was invented by the Ionian colonies in Asia Minor, about 1000 B. C.: and the *Corinthian order*, is said to have been first employed by Scopas, about 430 B. C.; the story that its capital was invented by Callimachus the sculptor, being doubtless fabulous. After Greece was subjugated by Rome, the Grecian orders were modified by the Romans; who added two other orders, of minor note; the *Tuscan*, and the *Composite*. This style has been somewhat further modified by the modern Italians; but its best specimens are those modelled after the ancient Greek. The *Gothic style*, originated as early as A. D. 1093, when pointed arches were introduced in Winchester cathedral, in England; or 1137, when they were used in the abbey church of St. Denis in France. This style afterwards underwent successive modifications; and it received its name from Inigo Jones, and Sir Christopher Wren; both of whom gave a preference to the Italian style.

We proceed to offer some farther details on this subject, under the heads of Elements of Architecture; Oriental Architecture; Classic Architecture; and Gothic Architecture.

§ 1. The *Elements of Architecture*, comprise a description of the various parts of buildings, with their construction and their modifications. The *foundations* of a building, are the lowest parts, usually carried below the earth's surface, to support the principal structure, or superstructure, resting thereon. They should extend to firm ground, below the reach of frost; or, when the ground is soft, they should be commenced by driving *piles*, or sharpened timbers, firmly down, for an adequate support. The *walls* of a building, are the sides which form the enclosure, whether of stone, brick, wood, or other materials. *Fire places*, and *chimneys*, are usually built in connection with the walls; and *doors* are provided for entrance, and *windows* for admitting light. The part immediately over a door or window, supporting the wall above, is called a *lintel;* the projections around the top and sides, the *architrave;* and the part at the foot is called the *sill*. *Arches*, are used either for support, or enclosure, as over doors, between columns, or piers, and for ceilings.

The *roof*, is the superior covering of a building; and, if rounded, it is called a *dome*. Roofs are either *flat*, that is level; or *pent*, that is with two opposite slopes; or *curb* roofs, that is with a double slope on each side; or *hip* roofs, having four slopes, extending down to the four walls. The frame of a roof, is composed of *trusses;* each including a pair of rafters, and a tie beam. A small dome, is called a *cupola*. *Floors* are surfaces for supporting persons and other objects, often dividing the building into upper and lower *stories*. *Stairs*, for connecting different stories, are either straight or winding; and their proportions depend on the length of the human step. *Partitions*, are used for separating *rooms;* and *galleries*, in public buildings, for accommodating a greater number of persons. A *piazza*, is a colonnaded shelter, along the whole front of a building: but a *portico* shelters only the door; and a *balcony* is a projecting floor on the outside of upper windows, not supported from beneath.

The front of a building, is called the *façade;* and the triangular part, at the end of the roof, is called the *pediment*. An *order* of Architecture, (Plate X.), usually comprises a *colonnade*, or row of columns, with their support and entablature. A *stylobate*, is a colonnaded platform, with steps, extending around a building; and a *pedestal*, is an elevated block, or mass, supporting one or more columns. A *column*, is a round pillar, or elongated support; and a *pilaster* is a square one. A column usually consists of a *base*, or enlarged part, at the foot; a *shaft*, or central part; and a *capital*, or ornamented part, at the top. The *entablature*, is the continuous part resting on the columns. It consists usually of an *architrave*, next above the capitals; a *frieze* or central part, separated from the architrave by mouldings; and a *cornice*, composed of projecting mouldings; forming the eaves. *Mouldings*, are continuous ornaments, projecting or receding; as the *torus*, or convex moulding, and the *scotia*, or concave moulding around the base of columns; the *echinus*, or convex moulding of the capital; and the *cymatium*, and *ogee*, which are convex on the one side, and concave on the other. The *ovolo*, *cavetto*, and *talon*, shown also in Plate X., are chiefly confined to the Roman style of Architecture.

§ 2. *Oriental Architecture*, includes the Egyptian, Hindoo, Chinese, and Moorish, or Arabian and Turkish. *Egyptian architecture*, seems to have been modelled after the cavern or mound; and it consists of catacombs, temples, pyramids, pillars, and colossal statues. It is characterized by sloping walls, with simple concave entablatures; flat roofs, and ceilings; and short ornamented columns: the capitals being sculptured with lotus leaves, human heads, or other figures; the entablature sculptured with a winged globe; and the walls, with a profusion of hieroglyphics. Of the *pyramids*, at Gizeh, that of Cheops is the largest building in the world; being 500 feet high, and 690 feet square at the base. The temples of ancient Thebes, that is, at Karnac and Luxor, with their avenues of lions and sphynxes, are among the most sublime monuments of human labor; though consecrated to a debasing idolatry. Similar to these, in its effect, is the ancient *Hindoo Architecture;* as illustrated in the caverns of Elephanta, Ellora, and Salsetta: but the modern buildings of India, are of a lighter oriental style. The ancient Persian architecture, as shown by the ruins of Persepolis, closely resembled the Egyptian.

The *Chinese style*, modelled after the tents of the Tartar conquerors, is characterized by its light and airy *verandahs*, or piazzas, often enclosed by lattice work; its slender columns, and widely projecting concave roofs; and its many storied *pagodas*, or idol temples, often octagonal, and covered with porcelain, with little bells hung at the angles; as in the porcelain tower at Nankin. The *Moorish architecture*, of Arabian origin, is also, for the most part, light and airy; with numerous *minarets*, or small domes, projecting above the roofs; with internal courts, shade trees, and fountains; and with a profusion of ornamental tracery, or lattice-work, resembling birds and flowers, called from its origin *arabesque*, and bearing some resemblance to the Chinese.

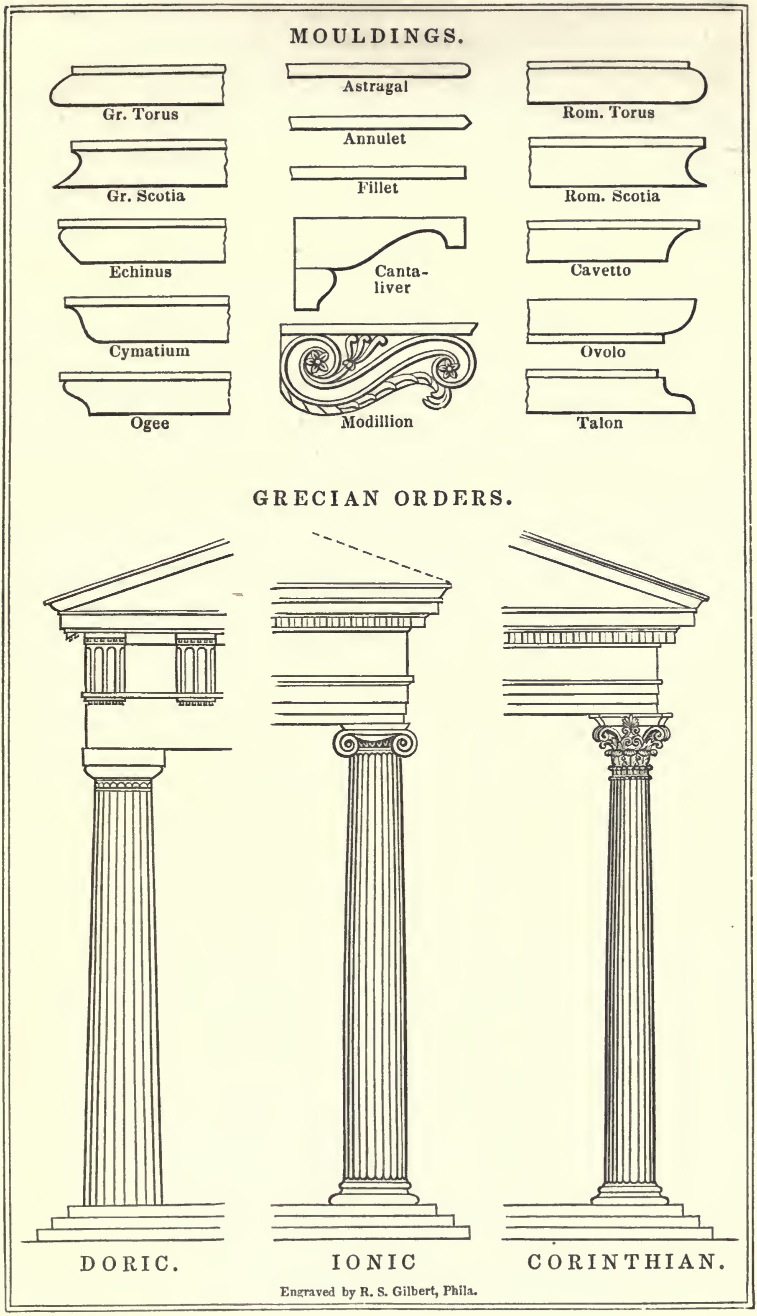
§ 3. Under the head of *Classic Architecture*, we comprehend the Grecian and Roman styles, with their later modifications. The Grecian style comprises three orders; the Doric, Ionic, and Corinthian. The *Doric Order*, (Plate X.), is characterized by its strength and simplicity: being the oldest order, and evidently modelled after the primitive log cabin. Its columns, resting on a *stylobate*, are usually 5 or 6 diameters high; and are peculiar in having no base: but are fluted, like those of the Grecian orders generally. The capital comprises an echinus, surmounted by an *abacus*, or tablet. The entablature is about one-third as high as the column: and the architrave is plain: but the frieze is composed of alternate *triglyphs*, or grooved projections, and *metopes*, or intermediate pannels, sometimes sculptured. The cornice comprises the *mutules*, or sloping blocks, like the ends of rafters, with *guttæ* or conical drops underneath; above which is the *corona*, or larmier, projecting far out to form the eaves; and above this is the *echinus*, or crowning moulding. The best model of this order, is the Parthenon, or temple of Minerva, in the Acropolis or citadel of Athens.

The *Ionic order*, (Plate X.), is more slender than the Doric, and is recognized by its simple *volutes*, or parallel scrolls, one on each side of the capital; their front ends being connected by what is called an *apron;* with an echinus, but no leaves, underneath. The Attic base, as well as the peculiar Ionic, consists of two *toruses*, (tori), or projecting mouldings, and an intermediate *scotia*. The columns are usually 7 or 8 diameters high; and the entablature less than one-third as high as the columns. The architrave consists of either one or three *fascias*, or distinct and slightly projecting surfaces; but the frieze is undivided, though often sculptured. The cornice has a row of *dentils*, or small tooth-like blocks, instead of mutules, underneath the corona; above which, the crowning moulding is usually a cymatium. As examples of this order, we may mention the Erectheum, in the Acropolis at Athens; and the temple of Diana at Ephesus.

The *Corinthian order*, (Plate X.), still more delicate than the Ionic; from which it is distinguished also by two rows of leaves, sculptured on the capital, beneath the apron. The Corinthian base has two *scotias*, alternating with three *toruses;* and the capital has not only four volutes, meeting obliquely at the angles, but smaller spirals, called *caulicolæ*, between the leaves of the upper row; the whole surmounted by an ornamental abacus. The column is 9 or 10 diameters high; the shafts, as in the preceding orders, being generally *fluted*, or cut in grooves; and the entablature is rather lower than the Ionic, in proportion to the height of the column. The architrave has three fascias; the frieze is either plain, or sculptured with figures; and the cornice has dentils, and a corona, like the Ionic; but is surmounted by *dactyls*, a favorite Grecian ornament, resembling leaves, united in clusters, like the fingers. The purest Corinthian model, was the Choragic Monument of Lysicrates, in the Acropolis at Athens; built before this order was modified by the Roman conquest.

The Romans adopted the three Grecian orders; but altered them, we think generally for the worse; by the introduction, for instance, of circular arcs, instead of elliptical, for the section or contour of the mouldings; and by adding a profusion of sculptured ornaments. The *Tuscan order*, is like the Roman Doric, deprived of its triglyphs; and the *Composite order*, also added by the Romans, may be regarded as a combination of the Roman Ionic and Corinthian; though sometimes less ornamented than the latter: whereas, it would seem to belong at the end of the scale, as the lightest and gayest of all the orders. The Arch of Titus, at Rome, was of the Composite order; but the Pantheon and temple of Jupiter Stator, were of the Corinthian. The Coliseum, at Rome, was a vast amphitheatre, capable of holding more than 90,000 persons. The great modern churches,—St. Peter's at Rome, and St. Paul's in London,—are essentially in the Roman style.

PLATE X. ARCHITECTURE.



§ 4. The term *Gothic Architecture*, is applied to that style which prevailed throughout Great Britain, France, and Germany, in the churches and castles built during the feudal and recent ages. It is characterized by the *great height*, and long vertical lines of its edifices; its lofty *towers* and *spires*, the former square, the latter pointed, as it were to pierce the sky; its *buttresses*, or projecting external piers, to strengthen the walls, with *pinnacles* surmounting them; its *pointed arches*, over doors and windows, the latter often subdivided by mullions; its *clustered columns*, formed of several small ones united; its *groined ceilings*, formed by pointed arches, often springing from pillars or corbels, and meeting in the groins or ogyves; and, finally, its great display of ornaments, or *tracery* and *entail*, on the ceilings, and around windows, and the galleries of churches. This style, therefore, unites the qualities of strength, sublimity, and neatness; producing, we think, especially in large buildings, a pleasing and solemn effect.

In the early Gothic style, from 1189 to 1272, the arches were acute, or *lancet*. In the pure Gothic, from 1272 to 1461, the arches were *equilateral;* each side being an arc of 60°: and in the florid Gothic, from 1461 to 1509, the *ogee* arch was used; the upper part being convex downward, and the whole depressed or flattened. The *cathedrals*, or minsters, that is the central churches of the dioceses, had generally a ground plan in the form of a *cross;* the *nave*, or longest branch, being turned towards the west, where was the main *portal*, or entrance; the *choir* facing the east, with its large *oriel*, or bay window; and the north and south branches being called the *transepts*. The choir contained the *chancel:* and the *rood loft*, so named from the *holy rood*, or holy cross, was placed in the centre of the cathedral. The best English specimens of this style, are the cathedrals of York, Ely, and Lincoln; and Westminster Abbey.

CHAPTER IV.

VIATECTURE.

We propose the term Viatecture, as nearly synonymous with Civil Engineering, to include the construction of roads and bridges, rail-roads, and canals, and water works; and the improvement of rivers and harbors. The basis of this term, in the Latin word *via*, a road, or way; as the construction or improvement of ways of communication is the principal object of *Civil Engineering*. The word *Engineer*, or its primitive word *engine*, is derived from the French *engin*, signifying any complex machine, but applied originally to machines used in war; the managers of which were termed Engineers. Civil Engineering was comprehended by Vitruvius, and the older writers, as a part of Architecture: and it was not until about the year 1760, that the term *Civil Engineer* was applied to the builders of roads, bridges, and canals; to distinguish them from Engineers, primarily so called, or Military Engineers. The term

Topographical Engineer, has been more recently applied to those persons engaged in making surveys or reconnaisances for viatectural, or similar purposes.

In 1771, Mr. John Smeaton, the constructor of the Eddystone Light House, and other works, procured the formation of a Society of Civil Engineers; since which time, this art has been recognized as a distinct profession. The term Civil Engineering has since been more widely extended, at least by some writers, to include the construction of machinery in general, and the arts of metallurgy and mining. For this reason, and for greater symmetry in the nomenclature, we have ventured to propose the term *Viatecture*, as above defined, to include a more limited and distinct range of objects, all of which properly be comprehended as arts of conveyance. The qualifications of the *viatect*, or civil engineer, should be essentially the same as those of the architect; though somewhat differently directed. On the importance of this art, already alluded to, in introducing this department, as one of the means by which improvement is extending its march among the nations, we have no farther room to expatiate.

The construction of *Roads*, must have commenced at an early period of history; and those of the Romans are justly celebrated; some of them being of masonry, several feet deep. Great improvements have been made, in modern France and England, particularly by McAdam and Telford, in the construction of stone roads, at once both cheap and durable. Of *Bridges*, the earliest remains are those of the Romans; who constructed no fewer than six, across the Tiber, at Rome. The first *cast iron* bridge, was that of Colebrookdale, over the Severn, erected in 1777. The earliest *Canal* for navigation that we can mention, was in Egypt, from the Nile to the Red Sea, begun by Necho, 616 B. C.; and completed by Ptolemy Philadelphus, 280 B. C. Other canals were constructed in Egypt; and a few in Italy, by the Romans, chiefly for purposes of draining. *Locks*, were invented in Holland, about A. D. 1371; and used soon after in Italy. The first great canal in France, was that of *Briare*, uniting the rivers Loire and Seine; begun in 1605, but completed in 1642: and the first of magnitude in England, was the *Duke of Bridgewater's* canal, extending from his coal mines, to Manchester, begun in 1758, and completed in 1776; Mr. Brindley being the Engineer. The *Middlesex* canal, in Massachusetts, the first of note in the United States, was begun in 1789, and completed in 1808; under the supervision of Col. Baldwin.

Railroads, appear to have been used in the stone quarries of ancient Egypt; and, at a more recent period, in the mines of Germany. They were first introduced in England, at the coal mines near Newcastle, in 1630 or 33. Iron rails were not used until 1738; nor on any extensive work until 1767, when they were employed at Colebrookdale. The first railroad in the United States, was that from the stone quarries, in Quincy, Massachusetts, to Boston harbor; completed in 1827. Locomotive engines, of imperfect construction, were invented and patented, as early as 1802, by Trevithick and Vivian; but it was not till 1829, when the great trial took place on the Liverpool and Manchester road, that their importance was appreciated; and they were found to be adapted for rapid, as well as cheap transportation.

The subject of Viatecture, is naturally divided into the study of Common Roads and Bridges; of Rail Roads; of Canals and Water-works; and of River and Harbor Improvements. Perhaps Gas Lighting belongs most closely to this branch of the arts; to which, if so, it may be regarded as an appendix.

§ 1. The construction of *Common Roads*, as well as of other viatectural works, should be based on a reconnaisance of the route or location; requiring, in all important cases, a regular survey, with levellings. The arts of *Surveying*, and *Topography*, belong, we think, more closely to this than to any other branch of the arts; and although they depend on mathematical principles, they are rather applications than essential parts of Mathematics. Roads, should, of course, be as straight as the places to be connected, and difficulties in the way, will allow. The rise should not be greater than 1 foot in 14, or 1-14; unless in extreme cases. The transverse, or cross section, should be convex; and for a road 20 or 24 feet wide, at least 6 inches higher in the middle than on the sides. *Side drains*, to carry off the water, and occasional *cross drains*, are necessary, to preserve roads in good order. To prevent the action of rain and frost on earthen roads, is the object of *stone roads;* which are covered with a crust of finely broken stone, called *metal*, from 8 to 12 inches deep, ultimately becoming so compact as to resist the impression of carriage wheels.

Bridges, are variously constructed, of wood, stone, or iron: and they may be classed either as *elevation*, or *suspension* bridges; the latter hanging on chains, firmly fixed at the extremities. Bridges should always rest on firmly founded *piers*. The simplest piers, used for wooden bridges, are formed by driving *piles*, or sharpened posts, in rows, crosswise of the bridge; and these rows framed together with cross timbers, are sometimes called *trestles*. Stone piers are sometimes founded by means of a *coffer dam*, or strong enclosure; from which the water is pumped out, leaving the bottom temporarily dry. Sometimes they are built in a *close caisson*, or water tight box, made to sink in its place, as it is filled with the masonry: and sometimes they are built by means of an *open caisson*, made of piles and pile planks driven down, and filled with *béton*, or a mixture of small stones and hydraulic mortar. The ends of piers, called *starlings*, have usually a rounded or pointed form, to break the ice, and divide the water in its passage. The *abutments*, or extreme piers, when they are to resist the pressure of an arch on one side only, have need of great thickness and strength.

§ 2. The construction of *Rail Roads*, like that of the best common roads, requires a careful preliminary survey, and great judgment in the location. The *track*, or line of parallel rails, must have no angular points, but change its direction by means of *curves;* which, unless in extreme cases, should have a radius of not less than 400 feet. Neither should the *slope*, or inclination of the road, exceed 30 feet in a mile, or in extreme cases 50 feet; if intended for locomotives with considerable loads. A greater rise than this, is sometimes overcome by *inclined planes;* with stationary engines, or other additional power. A *locomotive engine*, with 4 tons of its weight resting on the driving wheels, will draw with a force of at least 360 lbs. or 1-25th of its driving weight, without slipping on the rails: and this force of traction will draw a load, on level rails, at least 200 times as great, that is of 200 times 360 lbs.; or at least 32 tons.

After a rail road is *graded*, the excavations generally supplying earth for the embankments, the latter should have time to settle before the rails are laid down. Rails of wrought iron, are now preferred to those which are cast; as being stronger for the same weight, and less liable to fracture. The *train rails*, formerly used, having a flange to keep the wheel from running off, are now almost entirely superseded by the *edge rail*, with is rounded on the top, and does not collect the dust; the flange being transferred to the wheel. The rails sometimes rest on wooden string pieces and cross sleepers; but the best are fastened to stone sleepers, by means of iron chains, or fixtures. To enable the engines to pass each other, *turnouts* and crossings are constructed; with a *switch*, or moveable rail, to direct the car either to the main track or to the side one.

§ 3. The construction of *Canals*, and *Water Works*, is based, like the preceding works, on a careful survey and location. Canals are used either for *irrigation*, or watering; including *aqueducts*, for supplying water to buildings and cities; or for *desiccation*, as for draining marshy land; or for *navigation*, which last are the more numerous and important class. *Ship Canals* are usually 20 feet deep; *sloop canals*, 8 or 10 feet; and *boat canals*, from 3 to 6 feet deep; the banks having usually a slope of about 2-3, or two in height, to three of base. A canal must either be on one continuous level, or divided into several *levels:* and if one of these be higher than those on either side, it is called the *summit level;* being the most difficult to supply with water. This supply sometimes requires the construction of large and expensive *reservoirs*, and *feeders*.

The passage from one level to another, is effected by means of *locks*, formerly called chamber locks; with gates at each end. By shutting the lower gates, and gradually filling the lock, a boat, within it, is raised to the higher level; and the upper gates may then be opened, for it to pass on its way. The locks should, if possible, be so located, and the canal kept of such a height, that the contiguous excavations and embankments may be equalized, as nearly as circumstances will allow. Canals sometimes pass over streams, on *aqueducts*, or strong bridges; and sometimes, as in the case of rail roads, they are made to pass through mountains, by *tunnels*, dug for the purpose. Small streams pass under canals, through *culverts;* and superfluous water is carried off from canals by *waste wiers*. The supply of water required, will depend upon its loss, by leakage, lockage, and evaporation.

§ 4. The improvement of *Rivers* and *Harbors*, depends partly on the removal of obstructions, and partly on the construction of hydraulic works; requiring a thorough knowledge of the theory of currents, waves, and tides. The navigation of *rivers*, is improved by removing shoals, rocks, mud, trees, and snags, from the channel: and these improvements are effected by various means; as by *washing*, that is, causing a sudden flood to carry away the obstructions; or by *dredging*, removing the earthy matter with a dredging machine; or by *blasting*, for the removal of rocks; or by cutting and dragging, for the removal of driftwood, snags, and sawyers. These latter, stand erect in the water; but the *snags* are fixed; while the *sawyers* have a vibratory motion. Where the current is deadened, producing a shoal, the remedy is a *wing dam*, diminishing the width, and increasing the velocity. Where the current is too strong, producing rapids, the remedy is a short *canal*, with locks, and a dam if necessary at its upper end; for passing around the rapids or falls.

Harbors are improved, by removing obstructions, as above explained; and by building wharves, docks, and marine railways, for lading or repairing vessels; with light-houses, and beacons, to guide ships in entering; and piers, moles, jetties, or breakwaters, to shelter the harbor; or sea walls, and revetments, to protect the shores from abrasion. *Dry docks*, are so constructed, with strong gates bracing outward, that the water may be exhausted, after the ship has entered to be repaired. *Wet docks*, are made to be kept always full, and entered by ships only at high tide; in harbors where, without this aid, the falling tide would leave them aground. *Jetties*, are walls designed to turn the current, and wear the channel deepest in certain parts of the harbor. *Breakwaters*, are usually formed of a great mass of stone thrown into the sea, till it forms a wall rising above the surface, to shelter an important and exposed position from the waves. This subject is an extensive one; but we have no room here to pursue it.

CHAPTER V.

NAVITECTURE.

The branch of Navitecture, or Ship Building, relates to the construction of all vessels; whether ships or steamboats. We here extend the term to include a description of the rigging of ships; together with the construction of small boats, technically called boat building. The name Navitecture, is derived from the Greek ναυς, a ship, and τεκτων, a builder; and the appellation of *navitect*, would be applicable to persons engaged in this branch of art. The word *ship*, is from the Saxon *scip*, or the German *schiff;* and it is often used in a general sense, as synonymous with vessel; though it has also a specific meaning. Ship building is an art of great antiquity and importance; requiring a knowledge of the higher principles of Mechanics, and of Hylurgy, and Architecture, for its successful prosecution.

The first vessels, built in the primitive ages, were small boats, or rafts; sometimes covered with skins, and used for crossing rivers, or coasting within sight of the shore. The invention of *sails* has been attributed to Dædalus; but, on this point, nothing certain is known. The Phœnicians improved the art of ship building; and constructed vessels of greater size and strength. *Sailyards*, are said to have been invented 1240 B. C.; and *anchors* were used as early as 700 B. C.; previously to which, vessels in harbor were either stranded, or secured by halsers. The Romans dedicated their ships to particular divinities; and built some few vessels of enormous size. The invention of the Compass, already alluded to under magnetism, (p. 362), and especially the extension of voyages to the Indies, and to America, in pursuit of wealth, led the Spaniards and Portuguese to a bolder style of ship building, which was adopted and farther improved by the English. The ships built two or three centuries ago, were very high at the ends, and liable to bend, or become broken-backed. The theory of mechanics was first thoroughly applied to ship building, by Paul Hoste, in a work published at Lyons, in 1696; and this theory has been farther extended by Navier, in France; Atwood, in England; and Chapman, in Sweden.

The first project of Steam Navigation, worthy of notice, appears to have been that of Jonathan Hulls, of England; who, in 1736, proposed the construction of a steam tow boat, with paddles at the stern. In 1781, the Marquis Jeffroy, or Jouffroy, is said to have built a steam boat at Lyons, in France. In 1783, Rumsey of Va. conceived the plan of a steam boat, propelled by the reaction of a current of water, forced through the boat, in a cylinder extending its whole length: and he actually built a boat on this plan. In 1787, Mr. Fitch built a steam boat at Philadelphia, moved by vertical oars at the sides, and with considerable effect. The first boat actually propelled by steam, in England, was built by Symington, in 1788, with paddles at the stern. The project of propelling a boat by means of paddle wheels at the sides, was suggested by Oliver Evans of Philadelphia; and actually executed by him in 1804. But all these attempts were considered, by the world at large, as failures: and it was reserved for our countryman Fulton, to demonstrate the utility of steam navigation; by constructing, in 1807, a boat which made regular voyages, from that time onward, between New York and Albany. This improvement was not adopted in Great Britain, till the year 1812. The first voyage across the Atlantic, by steam, was made in 1819, by our countryman, Capt. Rogers; and the present system of trans-atlantic steam navigation, which commenced in 1838, forms a new era in this art, if not in the history of the world.

We shall treat briefly of Navitecture, under the heads of Ship Building, Ship Rigging; and Steamboats.

§ 1. The process of *Ship Building*, requires accurate drawings; which are often made on a large floor, and of the full size of the vessel. The drawing in elevation, is called the *sheer plan;* and gives the height and appearance of the ship as seen from one side. The cross section, showing the ship as seen from behind, is called the *body plan;* and a drawing of the ship, as seen from above, is called the *deck plan,* or half-breadth plan. These drawings presuppose a thorough knowledge of this art; as of the displacement of water by the ship; its centres of gravity and buoyancy; its stability or resistance to overturning; the best shape for sailing, and for receiving the load; the position of the masts and sails; and other considerations.

The fore part of a vessel is called the *bow*, or *stem;* and the hinder part, the *stern*. The lowest part, formed of projecting timbers, is the *keel;* which runs along the whole length, from the *cutwater*, in front, to the *rudder*, by which the ship is steered, at the stern. The rudder is turned, in small vessels, by means of the *helm* or tiller; but in large vessels, by means of a *wheel* and axle. The floors of a vessel, are called *decks;* and a higher portion, at the stern, is called the *quarter deck*. An opening through the deck, to receive the lading, is called a *hatchway*, or hatch; and the space within the vessel, which contains the cargo or load, is called the *hold*. The body of the vessel is called the *hull;* and the masts, sails, and ropes, for moving and managing the hull, are called the *rigging*.

The timbers of a ship being shaped, by means of patterns, from the drawings; the framing is commenced in the ship yard, usually near the water's edge. The keel is first laid, on the *stocks*, or supports prepared for it; and to this, the *stem* and *stern posts* are framed; being held in their place by shores or props. The *ribs*, or floor timbers, forming the sides of the ship, are next set up, and framed into the keel; and the angles at the ends of the ship, on each side of the stem and stern posts, are filled up by timbers called *futtocks*, held more firmly by *top timbers*, crossing them at the top. The *keelson*, *stemson*, and *sternson*, are then fitted over the keel, and end posts; as it were, doubling the keel, on the inside, and securing the whole together more firmly. The *beams*, or deck timbers, are then laid across; and the joints which they form with the ribs, are braced by *knees;* one branch of which is bolted to the rib, and the other to the beam. The frame is then ready for planking, calking, sheathing, coppering, and launching; all of which is done before the rigging commences.

§ 2. The *Rigging of Ships*, is, we think, more closely connected with Navitecture than with Seamanship; though it must necessarily be understood by sailors. A *mast*, is a timber, or series of timbers, erected in a ship, to carry the *sails*. When there are two masts, rising from the deck, the hinder is called the *mainmast*, and the other, the *foremast*. When there are three, the hinder is called the *mizenmast;* the next the mainmast; and the other the foremast. When shorter masts are placed above these, they are called *topmasts;* as the fore or main-topmast; and other masts, placed above these, are called *topgallantmasts;* distinctively named from the lowest masts which support them. Spars extending horizontally across the masts, are called *yards*, being named from the masts, and usually supporting square sails; while a *boom*, extending back from the foot of a mast, and a *gaff*, back from the top, support a trapezoidal fore-and-aft sail; as the mainsail in sloops and schooners. The *bowsprit*, projecting over the stem, and the *jib-boom*, in prolongation of it, receive the lower end of the jib and flying jib; which are triangular fore-and-aft-sails, extending down from the top of the foremast, to keep the vessel's head to the wind. Similar to these, are stay-sails, extending from the top of any mast, to the foot of the one next before it. The square sails, like the yards which support them, are named from the contiguous masts; and studding sails are sometimes added on each side, to enlarge them, when the wind is light.

The masts are held more steady by the *shrouds;* which are strong ropes extending from their tops down to the sides of the ship; and which, with cross ropes called *rattlings*, form ladders for the sailors to ascend. The masts are prevented from falling backward, by *stays*, or ropes extending from their tops downward and forward; and their *back-stays* have the reverse effect. The ropes for supporting the bowsprit and jib-boom, are called bobstays, martingales, and guys. Those for managing the sails, are *halyards*, for raising them; *sheets*, for turning them to the wind; with tacks, braces, lifts, and clewlines; all of which are called *running rigging*, to distinguish them from the standing rigging, which remains fixed.

Vessels are differently named, according to the manner of their rigging. A *sloop*, has but one mast; with gib, and mainsail, and sometimes a square topsail. A *schooner*, has two masts, but with fore-and-aft sails, except the topsails. A *brig*, has two masts, both carrying square sails; and a *brigantine* has two masts, but the hinder, or mainmast, is rigged like that of a schooner. A *ship*, has three masts, all square rigged: a *barque* has three masts, but the mizen mast not square rigged; and a *three masted schooner*, has three masts, all fore and aft rigged. A ship of 500 tons burthen should be about 100 feet long, and 30 broad; drawing about 12 feet of water.

§ 3. The construction of *Steamboats*, is similar to that of sailing vessels, except in the arrangements for applying the moving force. Steamboats require to be built very strong, on account of the strain and jarring of the machinery; but the general arrangement of the framing is the same as that which we have already described. For river navigation, and transportation of passengers, the deck is made much wider than the body of the vessel, by an extension of the deck timbers; an arrangement which, for ocean navigation, would be unsafe. The proper adjustment of the engine or engines, to the boat, as regards weight, shape, position, and power, is of course a subject of the highest importance. A steamboat of 300 tons burthen, suited for river navigation, should be about 120 feet long, and 30 feet broad; with about 6 feet draught of water; and should have an engine of about 55 horse power, weighing about 32 tons; with a cylinder of 3 feet diameter, a piston of $4\frac{1}{2}$ feet stroke, and paddle wheels 17 feet in diameter, and 5 feet long. The fly wheel, is entirely superfluous in steamboats, if they have two cylinders, with pistons acting on cranks, at right angles to each other, on the axle of the paddle wheels. For sea vessels, the engine is placed in the hold; and the paddles may be so constructed as to be unshipped, or taken in, during a gale.

The causes of *explosion* of steam boilers, are various; but chiefly, the excessive heating of the boiler, while the engine is stopped, and the sudden flow of water upon the heated part, producing the sudden generation of a great quantity of steam; the boiler at such times, being already overcharged, unless the steam has been escaping freely in the mean while. The best of all remedies, would be the thorough training of professed steam engineers, in the whole theory, as well as the practical use, of steam power: and next to this, the use of boilers without return flues, or chimneys, passing through them; with additional safety valves; and fusible plugs, which would melt and let out the steam, when too much heated. All large sea vessels should be provided with *life boats*, so built as to be incapable of sinking, even when filled with water.

CHAPTER VI.

NAVIGATION.

NAVIGATION is the art of conducting and managing vessels; especially while at sea, or sailing from port to port. In this definition, we include *Seamanship*, or the art of manœuvring a vessel, by means of the sails, anchors, and other appendages; considering this as an essential part of navigation, in its wider sense. The name is derived from the Latin word *navigatio*, of the same meaning; and this from the Latin, *navis*, or the Greek ναυς, a ship. Navigation depends on the principles of Mathematics and Astronomy, Physical Geography and Meteorology: and the sailing of vessels involves a peculiar class of problems in Mechanics. In connection with ship building, this art has been, and still is, one of the mightiest agents of commerce and civilization. It has rendered oceans, which would otherwise have been impassable, the great highway of nations; and the source of vast riches, from their extensive fisheries, and their submarine productions. The subject of *Æronautics*, or the navigation of the air, by means of *balloons*, has perhaps more relations to this branch than to any other; though it is a subject of minor importance.

Among the ancient nations, the Phœnicians were the most skilled in Navigation; and they are said to have directed their course by the stars, as early as 1630 B. C. Their voyages were mostly confined to the Mediterranean, and the neighboring seas; though some writers believe that one of their vessels circumnavigated Africa. The construction of maps was the greatest step attained by the ancients, in advancing the art of navigation. This art was revived, in modern times, by the rich commerce of Venice and Genoa with the eastern coasts of the Mediterranean. The invention of the Mariner's Compass, aided Vasco de Gama in discovering a southern passage to India; and guided Columbus to the discovery of a New World; thus enhancing the importance of Navigation, and stimulating others to its improvement.

The *log line* was introduced, about the year 1570, to measure the rate of a ship's sailing; and in place of the *Astrolabe*, with circular rings, and the *Arbalete*, or cross staff, for finding the altitudes of celestial bodies, the *Back staff*, invented by Davis, about 1600, and sometimes called Davis's quadrant, furnished a better method; until the introduction of Hadley's, or more properly *Godfrey's Quadrant*, invented by Godfrey, of Philadelphia, in 1730. Prince Henry of Portugal, revived the use of plane charts, to mark and indicate a ship's course: but the mode of allowing for the earth's sphericity, or the convergence of the meridians, was successively improved by Nunes or Nonius of Portugal, in 1537; by Mercator of Belgium, in 1569; and by Wright of England, in 1599. The invention of logarithms, by Napier, in 1614, and of Gunter's scale, in 1620, greatly facilitated nautical calculations: and the more exact measurements of the earth, and improved astronomical tables, of later times, have farther benefitted the art of Navigation. The British government, in 1763, rewarded Mayer for his new Lunar Tables, with a gift of £3000; and, in 1765, it awarded £10,000 to Harrison, for his invention, in the preceding year, of a Chronometer, sufficiently accurate to serve for finding the longitude at sea.

The principal topics of Navigation, may be comprehended under the heads of Seamanship; Dead Reckoning; and Astronomical Navigation, or Nautical Astronomy.

§ 1. *Seamanship*, is the art of sailing a ship; chiefly by managing the sails and rigging, so as to conduct it on the desired course, and preserve it from danger. The rigging of vessels, we have already described, as far as there was room, in the preceding branch. A ship, when in harbor, is either attached to some object on shore, by a strong rope called a *halser;* or is secured at a distance from shore, by one or more *anchors*, let down upon the bottom of the sea, and to which the vessel is attached by strong ropes, or chains, called *cables*. When a vessel heaves up her anchors, or casts off her fastenings, and hoists sail, to change her position, she is said to get *under weigh*. The left side of a vessel is called the *larboard*, and the right, the *starboard* side; and the side turned from the wind is also called the leeward. A *stiff* vessel, is one which will not easily overturn; in contradistinction from a *crank* one.

A ship sailing with the wind, that is, in the direction in which the wind blows, is said to have the wind *aft*, or to sail before the wind. When it blows crosswise of the ship, she is said to have the wind *abeam;* that is, against the beam ends, or sides. In this case, the sails are placed obliquely to the wind, which thus exerts a force to move the vessel at right angles to its own direction. When the wind comes from a point still more ahead, the ship is said to be *close hauled;* and by having the sails very oblique, most vessels can sail towards the point from which the wind blows, within 4 or 6 points, that is, 45° or 67½°. In this case, they sail slower, and make more *leeway;* drifting sideways with the wind, and falling off from the course on which they strive to sail. In order to approach a place to the *windward*, a vessel must frequently *tack;* sailing as directly as possible towards the place, but inclining alternately to the right and to the left of it, at each tack or turn.

Vessels always *tack* by turning their head towards the wind, and bracing the sails obliquely, to aid the turning, till the wind comes sufficiently on the other quarter; when the sails which act favorably are said to *draw*. To *gibe* a fore-and-aft sail, is to turn it so that it may receive the wind on the opposite side; and the same object is effected, in square sails, by *bracing* the yards obliquely in one or the other direction. When a ship turns, with her head from the wind, so as to receive it on the other quarter, she is said to *veer*. The danger arising from strong winds, is diminished by *shortening sail;* either taking in a part of the sails; or reefing, that is, contracting them, by tieing them in folds. In a sudden gust of wind, fore-and-aft rigged vessels should *bear up*, or head towards the wind; but square rigged ones should receive it abeam. In a storm, vessels sometimes *lie to*, or head towards the wind; and sometimes they *scud*, or *drive*, heading from the wind, when there is no danger from a lee shore.

§ 2. *Dead Reckoning*, is the mode of estimating the course and distance which a ship has sailed, by means of the compass and log, without the aid of celestial observations. The *course*, or direction sailed, as well as the *bearing*, or direction, of distant objects, is reckoned from the north or south point of the horizon, towards the east or west; on land, usually in degrees, but at sea, in *points*, each of which is equal to $11\frac{1}{4}$ degrees. The point called N. N. E. (north-north east), for example, is half way between N. E. and North; and E. N. E. is half way between N. E. and East. The *log*, consists of a flat, quadrantal piece of wood, loaded on the curved side, so as to make it float edgewise in the water, and attached by its three corners to a line, which, unwinding from a reel, when the log is thrown overboard, measures the distance which the ship sails, away from the log, in a half minute. The number of *knots*, run out by the log line, indicates the number of miles, per hour, that the ship is sailing. The log is cast at frequent intervals; the course being continually noted; and from these data, the actual course and distance gained, or *made good*, each day, are calculated by what is called Traverse Sailing; an application of plane trigonometry.

Distance gained by a ship, northward or southward, is called *difference of latitude;* and that gained eastward or westward, is called *departure.* The former, compared with the previous latitude, gives the latitude attained; but the departure, being expressed in nautical miles, differs, numerically, from the difference of longitude; except at the equator; owing to the convergency of the meridians. When, near the equator, this difference is neglected, in finding the longitude, the calculation of the ship's place is then called *Plane Sailing.* At a distance from the equator, the reduction is usually made by means of the proportion, cosine of the latitude : radius :: departure : difference of longitude; which last is thus found, by the method called *Middle Latitude Sailing.* In high latitudes, the surface sailed over may be considered as a portion of a cone, having its vertex beyond the pole; and the method of finding the ship's progress, on this principle, is called *Parallel Sailing.* The most accurate solution of this problem, is by the principle of Mercator's Chart; in which the parts of the earth towards the poles are represented as enlarged, to make the meridians parallel; the degrees of latitude being enlarged in the same proportion; by which the true bearings of places are accurately preserved. The application of this principle to problems in Navigation, is hence called *Mercator's Sailing.*

§ 3. *Astronomical Navigation*, or Nautical Astronomy, relates to the finding of a ship's position, by means of celestial observations; whether of the sun, moon, planets, or fixed stars. It consists of two principal operations; finding the latitude, and finding the longitude: as by these data the ship's place is defined on the earth's surface. The instruments chiefly used in taking angles for these purposes, are the reflecting *quadrant*, and *sextant*, and the *repeating circle;* all of which have a moveable arm, with an attached, or revolving mirror, which is turned till the image of one of the objects, seen by a second reflection from a fixed mirror, appears close by the side of the other object seen directly; when the vernier, on the arm, gives the angle between them, read off on the graduated limb.

The *latitude*, is most commonly found by observing the meridian altitude of the sun's lower limb; adding thereto the sun's apparent semidiameter, for the altitude of his centre; subtracting from this the *dip* of the horizon, which, at sea, appears lower than its true place; and subtracting also the *refraction*, produced by the atmosphere. Knowing, thus, the sun's altitude, and finding his declination by means of the tables, we find, by addition or substraction, the altitude of the equator, which is the complement of the latitude sought, or the difference between it and 90°. In the same manner we may find the latitude by means of the moon, or a star; but in the case of the moon, we must allow for the *parallax in altitude*, to obtain the direction in which the moon would appear if seen from the earth's centre.

The *longitude*, is found by means of the chronometer; which may either be used as a simple timepiece, for noting the local time of any celestial phenomenon; or, if well regulated, it may be regarded as showing the time at Greenwich, by comparing which with the local time, the difference of longitude is found; allowing 15° to an hour. In the former of these two uses, if an eclipse of one of Jupiter's satellites happens at 4 o'clock, P. M., by the ship's local time, when, as found by the Nautical Almanac, it happens precisely at noon, at Greenwich, then the ship must be 60° east of Greenwich, or in 60° of E. longitude. This difference of time is more commonly found, by observing the angle between the moon and a star, and noting exactly the local time; then finding, by the Lunar tables, the exact time at Greenwich when the moon and star make the same angle; correcting it in both cases for the parallax. In this way, the chronometer itself may be verified at frequent intervals, by means of *Lunar Observations:* and thus, wherever the ship may be, the actual time at Greenwich may always be known; and thence the longitude may be found, whenever the local time can be found, by celestial observations.

XIV. DEPARTMENT:

CHREOTECHNICS.

In the department of Chreotechnics, we include what are commonly termed the Useful Arts, exclusive of those comprehended in the preceding department; or, in popular language, the arts of Agriculture, Manufactures, and Commerce. The name is derived from the Greek, χρεος, necessity or utility, and τεχνη, an art; corresponding to the common appellation above mentioned. Strictly speaking, these arts rank with the preceding in utility; and all the arts are useful in a greater or less degree: but as the present classification required the adoption of some distinctive appellation for this group of arts, we have selected that above given, as the best which has come to mind. We may add, that the arts here comprehended, are more miscellaneous than those of any other department; and the classification, in this instance, may seem less natural than, perhaps, in any other. Still, the common association of Agriculture, Manufactures, and Commerce,—in connection with the necessity of assigning to them some definite place in the system,—will, it is believed, be found a sufficient reason for the arrangement here adopted; especially when compared with that of the other departments of this province, and with the system at large.

The connection between the arts above named, results rather from the aid which they afford each other, than from any similarity in their processes or operations. *Agriculture*, supplies some of the requisite materials; though many of them are obtained from the mines, the forests, or the sea, and hence have been treated of, collectively, under the branch of Hylurgy. By *Manufactures*, these materials are prepared for their immediate uses or objects; and, by means of *Commerce*, they are distributed in the various places where they are wanted for consumption or exchange. Thus, these arts conspire to promote the comfort, and thereby to advance the intellectual state of society. Were we to adopt the classification of the arts as either mechanical or chemical, those above named would be widely separated; and some of them would be entirely omitted in the province of Technology.

The antiquity of Agriculture, might seem to demand for it an earlier place in the present province; and would have obtained it, had there been sufficient affinity between this art and those assigned to the preceding department. But when it is considered that Agriculture, as an art, could have made but little progress before the construction of dwellings for shelter, and roads for communication, this argument will sink in importance; while the reasons already assigned for the present arrangement, will retain their full force. The subject of *Horticulture*, or gardening, is, we think, so extensive and interesting, as to merit a separate place, as a distinct branch of the arts, though closely allied to Agriculture, or the labors of the field. But there is another group of arts, standing next to these; and which, though very essential to our physical comfort, seldom meets with literary notice; we mean the arts of housekeeping and cookery. For this group, usually the province of the gentler sex, and sometimes comprehended under the title of Domestic Economy, we venture to propose the name *Domiculture*, as significant and distinctive, and symmetrical with the names of the preceding branches.

The word *Manufacture*, derived from the Latin, *manus*, the hand, and *facio*, I make, literally signifies the making of things by hand; but it is commonly applied to the fabrication of any small articles, whether immediately by the hand, or by the aid of machinery; as cloth, cabinet work, porcelain, and various machines, instruments, and utensils. The minor manufacturing pursuits, are often called *trades;* probably from the Latin, *trado*, I deliver; because the articles made are often delivered singly to customers, or purchasers. As the distinction between trades and other manufacturing pursuits, is vague and unimportant, and as the subject is so extensive as to merit a division, we propose to treat of manufactures under the two heads of *Vestiture*, and *Furniture;* the former comprehending the manufacture of cloth, and the arts subordinate thereto; and the latter comprehending the remaining manufactures of moveable articles, which collectively form an important group, though separately they are of minor importance. The subject of *Commerce*, may, we think, be properly comprehended as one single branch of Chreotechnics; the last in this department.

The arts above referred to, aside from those of construction and conveyance, probably furnish occupation to nine-tenths of the human race. Their pursuit is necessary, to a certain extent, for the maintenance of society; and honorable, in all cases, where it promotes the general welfare. It has stimulated the cultivation of the sciences, and thereby opened new avenues to truth and utility, discovery and invention. It has subsidized the powers of nature, and compelled the winds and the waters to come forth and labor, at the wheel and the forge, the loom and the lathe, that man may find time to tax his ingenuity, for new and farther improvements. But we are constrained to add that their pursuit may become too engrossing; especially when it has mere wealth for its object; and that unless relieved by intervals of rest, study, and meditation, it tends to degrade the mind, and absorb the better thoughts and feelings of our nature. We shall rejoice in the increase of labor-saving machinery, if it allow the laboring classes leisure for mental culture, and the charities of life: but if it have the effect of converting men themselves into mere money making machines, it is a result rather to be deprecated than desired.

The improvements which have been made, in the arts now under consideration, refer, for the most part, rather to their extension than to their excellence. The fields and gardens of the ancient Romans were nearly as well cultivated as our own: their food was quite as delicious; their dresses were as durable, and as gay, if not so fine in texture; their furniture was nearly as comfortable; and what they most desired, they procured, though at great expense, from foreign parts. But instead of a few fertile spots, vast regions, which were then impermeable forests, are now brought under tillage: silk, which in Rome was a luxury for princes, is now worn by the common classes of society; cotton, which there was barely known, is now, by the aid of machinery, become the cheapest of fabrics; domestic comforts are multiplied; and commerce, aided by the mariner's compass, and the mighty power of steam, now distributes with surprizing facility, the productions of every clime, over all the civilized portions of the globe.

With these introductory remarks, we proceed to consider the individual branches of Chreotechnics, in the order already pointed out; Agriculture; Horticulture; Domiculture; Vestiture; Furniture; and Commerce.

CHAPTER I.

AGRICULTURE.

Agriculture is the art of cultivating the ground; including, in its ordinary acceptation, the rearing and management of domestic animals. Its name is derived from the Latin, *ager*, a field; and *cultus*, tillage or cultivation; and the term *Rural Economy* has, we believe, nearly the same meaning; including, perhaps, something of Architecture and Gardening. It has been termed *Farming*, from the word *farm*, which in England usually signifies a portion of land leased or rented; and it has also been called *Husbandry*, though this word has often a wider signification, as synonymous with good management of one's business, and provision for one's family. Agriculture, though apparently simple in its operations, still derives benefit from various sources of knowledge. From Machinery, it borrows its implements; from Chemistry, it may derive a knowledge of soils, and the means of fertilizing them; from Botany, a knowledge of the plants which it cultivates or eradicates; and from Zoology, it may learn the habits and peculiarities of the animals which it rears, with the means of improving and training them for greater utility to mankind.

As Agriculture is one of the arts essential to the existence of society, it was cultivated in the earliest ages of human history. Cain was a tiller of the ground; Abel was a shepherd; and Noah planted a vineyard. That this art was carried to great perfection in ancient Egypt, is evinced by the dense population which that remarkable land must have sustained, in the age when the pyramids were in progress, and Thebes was in its glory. The poem of the Works and Days, by Hesiod, is a description of early Grecian Agriculture; and the Geörgics of Virgil, the Natural History of Pliny, and the fragments of Columella, and other writers, which have come down to us, show in what high estimation this art was held in ancient Rome; where generals and dictators returned to the plough, after the triumphs of the battle field.

By the Roman conquests, their knowledge of Agriculture was disseminated, not only throughout southern Europe, but through France, England, and perhaps a part of Germany. This art languished, every where, during the Dark Ages, on account of the general insecurity of property, and the transient interest felt by cultivators in lands which were not their own. Agriculture began to be studied methodically, in the principal countries of Europe, about the middle of the 16th century. The earliest modern work on this subject, was that of Crescenzio of Bologna, entitled, *In Commodum Ruralium;* written in 1300, and printed in 1478. The earliest English work on Agriculture, worthy of note here, was the *Book of Husbandry*, by Sir Anthony Fitzherbert, printed in 1523. The Scottish Agricultural Society was formed in 1723; and the British Board of Agriculture was established in 1793; through the exertions of Mr. Marshall, and Sir John Sinclair. Loudon's Encyclopædia of Agriculture, is doubtless the most valuable treatise on this subject which has yet appeared in Great Britain.

In France, there were, in 1761, no fewer than 13 agricultural societies, and 19 auxiliaries. An agricultural survey of that kingdom was completed in 1789, by Arthur Young; and more recent general views have been given by Chaptal, Dupin and others, exhibiting decided improvements. A national garden was established, for the trial of experiments in Agriculture; but whether it is still flourishing, we are not informed. The state of this art in Germany, has been described, by Hodgson, and others, as generally and rapidly advancing. In our own country, owing to the abundance of uncultivated land, this art has been less refined upon, than in the old world; except, perhaps, in the vicinity of our cities and large towns. The subject is however growing in interest; and the writings of the late Judge Buel and others, are an earnest of the attention which it cannot fail to excite, as our population increases.

We may distribute the branch of Agriculture under the heads of Agricultural Implements; Preparing Lands for Tillage; Fertilizing the Soil; The Cultivation of Vegetables; and The Rearing of Animals.

§ 1. On the perfection of *Agricultural Implements*, including Machines, depends much of the improvement of which this art is susceptible. We may commence their enumeration with the cart, waggon, sled, sleigh and wheelbarrow; all of them useful for various purposes of transportation. The Pennsylvania waggon, is remarkable for its great size, its long body, with sloping ends, and its covered top, of canvas, supported on bent hoops or ribs; it being drawn by four or six horses, and used for carrying heavy loads to a considerable distance. Next to these vehicles, we may mention the *axe*, and the *saw*, for forest work, or felling and cutting up trees; the *plough*, for turning up the ground; the *harrow*, for pulverizing and smoothing it; the *hoe*, and *spade*, for planting and weeding; and the *shovel*, for removing earth, or other loose substances. The *drill*, is a machine for planting or sowing seed; and the *cultivator*, is a somewhat similar machine, for harrowing, and removing weeds: these machines being worked, sometimes by horse-power, and sometimes by hand.

For gathering crops, the *scythe*, and *rake*, are used in hay making; the *sickle*, and *cradle*, in harvesting; the *flail*, for threshing, and the *fan*, or van, for winnowing grain. The *horse rake*, has been recently introduced in our own country, for raking hay; and it is deemed a very valuable implement. Machines have also been invented for mowing; for reaping, and threshing, and winnowing grain; and for shelling Indian corn: but excepting for the two latter purposes, we are not certain that they have yet answered the end proposed, the saving of manual labour on a large scale. The mowing and reaping machines, are propelled by horses; and have points or fingers projecting forward into the grass or grain, by which it is held, until cut off by a sliding or revolving scythe or knife.

§ 2. The *Preparing of land for Tillage*, consists in clearing it of trees, where they are found; fencing it, in proper portions, called lots; and draining it, where it is marshy; or irrigating it, if water for the purpose is accessible, where it is too dry. In our own country, the clearing of land is generally effected by *felling* the trees with the axe; but sometimes the larger trees are left standing, and merely *girdled*, by cutting all around them, through the bark, so deeply as to cause their death and decay. In the newly settled portions of the country, the wood is of so little value, that it is piled in heaps and burned, to free the land of its incumbrance. Machines have been constructed for raising and removing the stumps of trees; but it is considered far cheaper, where economy alone is concerned, to leave them, till they become so loose, by the decay of the roots, as to be easily removed. It is to be regretted that in some extensive districts of our country, scarcely any trees have been left, for ornament or shade.

The object of *fencing* land, is either to prevent the access of the larger animals, or to keep them within certain limits. Fences are of various kinds; as the *log fences*, of new settlements; the lighter *rail fences*, including the zigzag or Virginia fence, and board and lattice fences for ornament; the stone walls of New England; the turf and ditch fence, used where stone is not procurable; and the hawthorn hedge, which decks the fields of England with its annual bloom. Stone walls are the most durable fence; while they absorb the surface stones, which would impede the cultivation. The draining of marshy or wet land, is effected, by *blind drains*, which are filled with loose stones; or *box drains*, having a free passage, but covered over, with a permeable covering; or *open drains*, which are mere trenches ploughed or dug along the surface of the ground. On sloping lands, they should run obliquely along the side, in order that their descent may not be too rapid.

§ 3. The different modes of *Fertilizing the Soil*, have been suggested, partly by chemical analysis, and geological observation, and partly by experiments; which are of course the decisive test of their relative value. The *soil*, is the uppermost stratum of the earth's surface; and consists chiefly of pulverulent earthy matter, resulting from the decomposition of ancient rocks; mingled with vegetable matter, by which it is distinguished from the *subsoil* beneath it. The chief earthy constituents of soils, are gravel, and *sand*, of variable fineness; *clay*, consisting of alumina and silex; *chalk*, or carbonate of lime; and the *oxide of iron*, usually communicating a red color. Clay absorbs moisture, and thereby becomes soft; but when dry, it is too hard and stiff for the fibrous roots of plants to penetrate. Sand, gives looseness and lightness to soil; but, not retaining moisture, it speedily becomes too dry for vegetation. Hence the best soil is chiefly a mixture of clay and sand, with a due proportion of the other earths, and a large supply of vegetable and animal matter. Such a mixture is properly called *loam*.

Soils have been classified, according to their chief ingredients, as loamy, clayey, sandy, gravelly, chalky, and peaty, or mossy; the latter consisting chiefly of vegetable matter, or *mould*, which is very retentive of moisture. Of these varieties, loamy soil, is, as we have already explained, the best; but the others may be ameliorated, by adding the ingredients in which they are deficient; as adding sand and lime to a clayey soil, or clay to a gravelly one. Clayey soils, when well prepared and manured, are suitable for wheat, oats, beans, and clover: but they require breaking up, or fallowing, more frequently than most other kinds. Sandy, or light and dry soils, are suitable chiefly for barley, turnips, and the drier grasses; and wet soils are best appropriated for raising succulent grasses, and oats.

Most soils are improved by the application of suitable *manure:* but the kind required, varies with the nature of the soil. Lime is a good manure for clayey soils; and gypsum, for sandy ones; perhaps because it attracts moisture. Marl, on account of its containing potassa, mixed with clay, is an excellent manure, especially for sandy soils; and wood ashes, which also contain carbonate of potassa, are of similar use. But vegetable and animal manures, especially with proper mixtures of the preceding, are chiefly to be depended upon, in rendering soils more fertile. The *composts*, thus formed with refuse organic matter, should not be exposed to heavy rain, while heating and fermenting; as it would wash away their soluble salts, and greatly diminish their value. Certain plants are found to require a peculiar nourishment; wheat, for example; which will not grow to a full kernel, in a soil wholly destitute of lime. Next to the application of manure, and equally important, for some crops, is the thorough *breaking up* of the soil, by ploughing or otherwise; by which it is loosened, exposed to the air, and its nutritious ingredients brought into action. All plants exhaust the soil; but in different degrees, and of different ingredients; and hence the importance of due rotation of crops, to keep the land in good heart.

§ 4. The *Cultivation of Vegetables*, consists in sowing or planting the seed, in ground properly prepared; in fostering its growth, by stirring the soil and eradicating noxious plants, or weeds; and finally, in gathering and preserving the products of this labor. The plants thus cultivated are mostly grains, esculent roots, and grasses, for the food of men and domestic animals; or flax, hemp, cotton, and other plants, useful in the arts. The production of fruits and garden vegetables is reserved for the succeeding branch of Chreotechnics. *Grains*, including wheat, rye, barley, and oats, are cultivated by ploughing, manuring, and harrowing the ground; then sowing the seed broadcast, that is, scattered over the whole surface, and slightly covering it with the harrow; after which no farther labor is required till the harvesting; when the ripe grain is cut with the sickle or cradle, bound in bundles, and stored till perfectly dry; then separated from the straw or culm, by threshing and winnowing. Similar to this, is the cultivation of *rice*, in the wet lands of our southern states. Maize or Indian *corn*, and *potatoes*, are planted in hills, or rows, usually three or four feet apart: and they require repeated hoeings, to subdue the weeds and accumulate the earth around the roots. The top stalks of maize, should not be cut until the kernels are formed in the ears; otherwise the plants would be unfruitful. The field, or common *turnip*, may be raised by scattering and covering the seed, in ground well tilled, without farther cultivation.

The grasses most cultivated in our country, are clover, herd's grass, red top, and furze top, succeeding each other in soils which have been previously tilled. Herd's grass, or *timothy*, grows well in stiff clayey soils: orchard grass is best suited for dry soils; and foul meadow grass answers well for soils which are wet. Grass, after being mowed, is spread to dry, and thus converted into hay, which is then raked together and secured in stacks or barns. *Flax* and *hemp*, are sown broadcast; and require no farther tillage; but, when mature, they are pulled by the roots, and subjected to the process of rotting, to remove the woody parts from the fibrous coating. *Cotton*, is planted in rows, and weeded at intervals; and the pods are picked, from time to time, as they ripen. *Tobacco*, is first sown in beds; and afterwards transplanted, in rows, for tillage: and the leaves are gathered when sufficiently mature. The *sugar cane*, is cultivated like maize; and sugar is obtained from the expressed juice of the green stalks.

§ 5. The *Rearing of Domestic Animals*, is chiefly confined, in our own country, to horses, cattle, sheep, and swine; which are collectively termed, by farmers, *live stock*. There are various breeds of *horses;* of which the Arabian is the fleetest; but those of colder climates, as the Dutch, and Scotch, are more hardy, and better for draught. Horses require careful treatment, as they are subject to various diseases; the cure of which belongs to *Farriery*, or the Veterinary Art, thus connected with the pursuits of the farmer. Some of these diseases are caused by the animal taking cold, after being overheated; by which the lungs especially are injured: and the disease called the *bots*, is caused by the horse swallowing the eggs deposited by flies upon his hair; the larvæ produced from which, gnaw through the stomach. The blacksmith, who practises shoeing horses, often acquires a knowledge of Farriery.

There are also various breeds of *cattle;* as the Dutch, or short horned; the Lancashire, or long horned; the Galloway, or no horned; and the Kyloe, or Highland breed. Those are preferred which are hardy, which yield the most and best milk, and which fatten well, producing the best beef. Cattle should always have access to a good shelter, especially in winter. *Sheep*, may be classed as long wooled, and short wooled; including numerous breeds; of which the Merino, imported from Spain into England, in 1787, having fine wool, is the most valued. Sheep also do best when properly sheltered, of course with access of fresh air: and they are sheared, for their fleeces, in the spring, when the weather has become settled and warm. A preference should be given to those breeds of *swine* which have the best form, and fatten best; and they should neither be suffered to run at large, nor yet confined too closely. Of the raising of silkworms, poultry, and other animals, we have no room here to speak.

CHAPTER II.

HORTICULTURE.

Horticulture, or Gardening, is the art of preparing and cultivating gardens; including pleasure grounds, and ornamental shrubbery. The name is from the Latin, *hortus*, a garden; and *cultus*, tillage, or management; and it is sometimes divided into Horticulture proper, or the cultivation of vegetables; and Landscape Gardening, or the laying out of grounds. Horticulture has so close relations with Agriculture, that it is difficult to draw the line of division between them; though sufficiently distinct in their principal features. As involving principles of taste, and elements of beauty, Horticulture, like Architecture, might be grouped with the Fine Arts, as a branch of Callotechnics: but its connection with the Useful Arts, especially in our own country, we regard as the stronger relation. Whether considered in reference to utility, or ornament, it is an art which deserves much attention, and exerts a salutary influence on its votaries.

Horticulture is the most ancient art of which we have any record: for we read that Adam was placed in the garden of Eden, to dress it and to keep it. We read also of the hanging gardens of ancient Babylon, supported on arches, one tier above another: and the gardens of Solomon, are glowingly described in the sacred Canticles. The Academy, or Academian grove at Athens, was an extensive public garden, frequented by orators, poets, and philosophers. The Romans, also, in their days of prosperity and luxury, paid great attention to gardening; as illustrated in the descriptions of their princely villas, and imperial palaces. Many of our choicest fruits, shrubs, and flowers, derived immediately from England, were transplanted thither from the milder climes of the south, and were also the favorites of the ancient Greeks and Romans.

Gardening appears to have been much cultivated in England, by the Romish clergy; as gardens and orchards are frequently mentioned in the charters of convents, granted in the twelfth and following centuries. The cultivation of vegetables was much patronized by Henry VIII.; prior to whose reign, cabbages, and other kitchen vegetables, were imported in large quantities from Holland. The early work of Fitzherbert, on Husbandry, already alluded to, extended, also to gardening; and it was succeeded, in the reign of Queen Elizabeth, by the Gardener's Labyrinth, and other Horticultural works. The first hot houses, and ice houses, in England, are said to have been built by Charles II.; who introduced the French style of horticulture, in his royal gardens. Evelyn's Complete Gardener, published in 1693, has acquired great celebrity; and become the basis of more modern works. In our own country, the beautiful garden laid out by John Bartram, about the year 1720, on the banks of the Schuylkill, below Philadelphia, deserves particular mention, as containing a large proportion of all the forest trees of North America.

We proceed to treat briefly of Horticulture, under the heads of Landscape Gardening; Kitchen and Table Gardening; and Botanical Gardening; the latter relating to shrubs, flowers, and medicinal plants.

§ 1. Under the head of *Landscape Gardening*, we include the laying out of gardens and pleasure grounds: the planting of shade trees; and the construction of fountains, green houses, and hot houses; with the erection of statues, arbors, grottoes, and other similar ornamental structures. In selecting the location of a garden, a southern exposure should be chosen, inclining to the east rather than to the west; of fertile soil, and neither too moist nor too dry. It should be properly enclosed; and the walls or fences concealed or covered, at least in part, by shrubbery. If the ground be sufficiently extensive for *plantations* of trees, they should be distributed in groups, rather than formal rows; and in the higher as well as the lower parts of the garden. The *walks*, should be gravelled, or otherwise prepared; and they should be, for the most part curved, rather than straight: waving or variable curves being more beautiful than the circle or circular arcs. If there be any striking ornaments, as *summer houses*, arches, or fine prospects, the walks should be so arranged as to make them prominent in the view.

All gardens require to be well provided with water. In small establishments this may be supplied from the farm or family *well:* but large gardens require a greater supply, which may be rendered ornamental, as well as useful, by the construction of a *fountain*. Jetteaux, or jets, of water thrown upward into the air, are produced by pressure; the water flowing through a small orifice, from some higher source: and the water may either fall into a basin, or be allowed to flow away and disperse itself in the ground. All large gardens are provided with *green-houses*, with roofs chiefly of glass, for sheltering the less hardy plants, which are protected from frost, if necessary, by artificial heat; and *hot houses*, similar to green houses in their construction, but provided with furnaces, or heated by steam, and kept always at a higher temperature, for the growth of the most delicate plants, which are natives of a tropical clime. The smaller plants are usually placed in pots, and arranged on shelves, rising one above another, so that they may all have access to the light. *Hot walls*, are sometimes constructed, with furnaces and extensive flues, for forcing the growth of wall fruit, by artificial heat. *Arbors*, covered with vines, are highly ornamental in gardens, and present a grateful shade in hot weather. Of grottoes, statues, and other like ornaments, we have no farther room to speak.

§ 2. Under the head of *Kitchen and Table Gardening*, we comprehend the cultivation of vegetables, and of fruit, for the kitchen and the table. This division of Gardening, is doubtless the most useful; as supplying no small portion of our vegetable food. The ground allotted for raising esculent or kitchen vegetables, should have a deep, rich soil, well manured, and thoroughly tilled. It is usually laid out in small compartments, termed *beds*, with narrow paths, or walks, between; especially for those smaller vegetables which would be injured by walking among them. Garden potatoes, of the richer and earlier kinds, are cultivated like those in the fields: and tomatoes, of which the fruit alone is eaten, are raised in a similar manner. Peas are planted in rows; and the larger kinds require *bushing*, that the vines may cling to the dry bushes for support. Some varieties of beans, require the support of long poles, like the hop and the vine: but most kinds are of low growth. Cucumbers, squashes, and melons, are planted in hills, which should be filled deeply with manure; but cabbage, cauliflower, and broccoli, beets, carrots, and parsnips, turnips and onions, are planted singly, at short intervals, in beds of deep soil. Of salads and herbs, as the radish, lettuce, celery, asparagus, sage, and mint, we can make no farther mention.

The plantation of *orchards*, for the larger fruits, as apples, pears, plums, peaches, cherries, and quinces, belongs alike to agriculture and to gardening. The young trees are raised from the seeds, in nurseries, and then transplanted to a more ample space. Fruit trees, thrive well along the walls of gardens; where they also serve for shade. In training fruit trees, the processes of *grafting*, and *inoculating*, are often resorted to, in order to improve the quality of the fruit; by taking shoots, or buds, from approved trees, and inserting them on others, where, with proper precautions, they continue to grow. The grape vine, is an appropriate ornament for bowers or walls; and is also cultivated in green-houses, called *graperies*. Shrub fruits, as the currant, gooseberry, raspberry, and blackberry, are appropriate for borders: while the strawberry is raised in beds; and, like various other plants, requires some protection from the vicissitudes of the winter.

§ 3. Under the head of *Botanical Gardening*, as already explained, we include the cultivation of flowers, and ornamental and medicinal, as well as rare and exotic plants. A private *flower garden*, should form an ornamental appendage to the mansion; and be visible and easily accessible therefrom: the kitchen garden and orchards lying beyond it, towards the open fields. It should be well supplied with evergreen trees and shrubs, which give it a cheerful appearance, even in winter; and the box and smaller evergreens are occasionally used as *edgings*, surrounding the flower beds or compartments. Much skill, as well as taste, may be displayed in the distribution of the flowers, with reference to their seasons of flowering; so that as some of them decline, others may come in bloom, and thus preserve the beauty of all parts of the garden, during the whole season. The part appropriated to roses, is called the *rosary;* and when a part is overflowed, for growing aquatic plants, it is called the *aquarium.*

Among the more prominent flowers, we may mention the rose, dahlia, tulip, pink, and lily; of all which there are numerous species and varieties. Of climbing flower plants, the Champney rose, the honeysuckle, the jessamin eor jasmine, and the bignonia or trumpet flower, are among the most beautiful: and of flowering shrubs, we may mention the lilac, snowball, althea, and laburnum. We must abstain from any attempt to particularize the numerous rare and medicinal plants,—many of which require artificial warmth and shelter;—as our limits for the present branch are already transcended.

CHAPTER III.

DOMICULTURE.

We propose the name Domiculture, to include the subjects of Housekeeping and Cookery; which collectively are deemed of sufficient importance to rank as a distinct branch of the Useful Arts. The name is derived from the Latin, *domus*, a house; and *cultus*, culture or attendance. It is nearly synonymous with *Domestic Economy;* but we have adopted the former term for the sake of brevity, and a more symmetrical nomenclature. This branch is related, it will be seen, to Agriculture and Horticulture on the one hand; and to the arts of Vestiture and Furniture on the other; from which considerations its place in our arrangement is clearly defined. It comes, even more closely than the preceding branch, within the province of the fair sex; and hence, on the score of gallantry, deserves especial notice; though its labors, particularly in large establishments, are often assigned to those of sterner mould.

We have mentioned Cookery, apart from Housekeeping, because the former, though often, is not always comprehended under the latter: many families, particularly in European cities, procuring their food, already prepared, at shops where cooking is made a regular business. *Housekeeping*, in its more limited sense, relates to the general management of a house; the selection and arrangement of furniture, and the constant attention required by the wants and for the comforts of a family. The name *Cookery*, from the Latin, *coquo*, I cook, though ordinarily restricted to the mere dressing of food, is here used in a more extended sense, to include all preparations of food and drink; as Baking, Confectionary, Brewing, Vinting, and Distilling, and the polite art of Carving, often practised at the table. Cookery produces important changes in the constitution of food, thereby rendering it more or less easily digestible; some of which changes, Chemistry has not yet been able to explain.

In ancient times, the labors of Housekeeping extended to the spinning, weaving, and fashioning of most articles of clothing: or rather these labors were performed in private dwellings. The art of Cookery, was somewhat cultivated by the Greeks; but still more so by the Romans; whose luxury is perhaps in no case more conspicuous than in the extravagance of their entertainments. Dishes of singing birds, peacock's brains, goldfishes' livers, and pearls dissolved in vinegar, are examples of their insatiate epicurism, in an age when Rome was sinking to decay. Under Tiberius, there were teachers, and schools of cookery in Rome; and the inventor of a new dish was sometimes munificently rewarded. Their dishes, like the modern Italian, were characterized by the free use of oil, from their native olives; while the French cookery is distinguished by its light soups, and meats variously disguised; and the English dishes are noted for substantiality, as in their national roast beef and plum-pudding.

Our further remarks on Domiculture will be embraced in the topics of Housekeeping; Cookery; and Butlery, or the preparation and selection of table liquors.

§ 1. The study of *Housekeeping*, naturally commences with the selection and arrangement of furniture; and the engagement of servants, where servants are required. Good taste requires that the furniture of the same suite of rooms, or at least, of the same room, should harmonize, or correspond throughout. Thus, if the sofa be of mahogany, the chairs, tables, and sideboards should be of the same material; though the black walnut furniture is by some preferred to that of mahogany. A correspondence, even of the frames of mirrors and pictures, whether gilt or otherwise, presents an agreeable effect. In general, there should be one predominant color; especially of the carpets, and curtains, or hangings; with which the rest of the furniture should harmonize. A plain and neat style of furniture we think far preferable to the more gaudy and ostentatious.

Next in order, comes the procuring of supplies of fuel, provisions, and other stores; which vary in different places, and require the aid of local experience, in regard to the selection and quantity. The warming of rooms,—where anthracite is used,—by means of cellar stoves, and air chambers around them, with flues for conducting the warm air into the different rooms, is a method which we think is gradually gaining ground in public favor; and it prevents much dust from being dispersed from the fire grates, and injuring the furniture. Rooms with white walls, are more easily lighted than those with dark: and the effect of lights placed against walls, is much increased by introducing mirrors behind them. The labors of housecleaning, which require to be at least semiannually repeated, we leave to be directed by the housekeepers, whose province it is to superintend them. The same remark may be applied to laundry work, or the washing and ironing of clothes; and to various other household arrangements.

§ 2. The labors of *Cookery*, comprise the preparation of animal food, farinaceous food, confectionary, and beverages. Of the relative healthiness of different kinds of food, we have already briefly spoken, in treating of Hygienics. (p. 420). The principal meats, such as beef, venison, mutton, and fowls, are generally preferred *roasted;* the process consisting in exposing them before the fire, on a spit which is constantly turned. Mutton is sometimes, and fish are generally, *boiled;* by keeping them, for a sufficient time, in water at a boiling temperature. Meats are said to be *baked*, when roasted in a close oven; *broiled*, when cooked upon a gridiron; *fried*, when heated with lard or butter; and *stewed*, or fricaseed, when boiled to a soft state, with but little water. At entertainments, where several courses are served, soup is generally the first dish; and fish is introduced before meat; the dessert, of confectionary and fruits, concluding the service.

Farinaceous food, is that derived from plants called *cerealia;* as wheat, rye, and corn; or from esculent roots, as the potato, beet, and turnip, which contain more or less farina or starch. Among these, wheat contains the greatest proportion of gluten, and hence makes the lightest bread. *Bread*, is formed, by mixing flour with water, and with leaven or yeast; which latter excites the panary fermentation; partly converting the starch into sugar, and the sugar into alcohol and carbonic acid: and this latter, being retained, in gaseous bubbles, by the gluten, causes the *dough*, or unbaked bread, to rise. It is then baked, at a regulated temperature; during which process the alcohol, and sometimes the carbonic acid escapes; in the latter case causing the bread to fall, or become heavy. *Cakes* are made in nearly the same manner; but pastry, including pies and puddings, does not require yeast; the flour, when used, being mixed with butter. Rice, and potatoes, and other esculent roots, are usually cooked by boiling; and are the most healthy when thoroughly cooked.

The term *confectionary*, from the Latin *conficio*, I concoct, or prepare, is properly applied to both sweetmeats, and pickles; the former being preserved with sugar, and the latter with vinegar. *Sweetmeats*, are made of various kind of fruit, as the apple and peach; and require a large quantity of sugar, to prevent them from fermenting and moulding. They are sometimes reduced, by means of boiling and straining, to a *jelly;* resembling hydrous gelatin, or animal jelly, only in form. *Pickles*, are made from various vegetables, as the cucumber, and mango, simply preserved in vinegar, with the occasional addition of salt and spices. Pickles should never be made in brass or copper vessels: nor should either pickles or sweetmeats be kept in vessels containing copper or lead, nor in earthen vessels glazed with lead; as the acid which they contain would form, with these metals, salts which are poisonous.

Of *beverages*, water is the natural drink of man, after the period of infancy; and if it be pure, none can be more healthy. Milk, especially when diluted, forms also a healthy drink, and quenches the thirst better than liquids which are stimulant. *Chocolate*, is made from the cacao nut, which grows of the shape and size of the almond; and a drink is sometimes made of the *shells* of the same nut. This latter drink is purer than the chocolate; which contains a large portion of oil or butter; and they are both less stimulating than tea or coffee. Tea is made from the leaves of the tea plant of China; and coffee from the seeds of the coffee tree of Arabia. They are both stimulants, but coffee the most so; and when taken hot and strong, they often, in process of time, debilitate the digestive organ.

§ 3. The term *Butlery*, applies in a strict sense to the selection and preservation of table liquors: but we shall here extend it to include also brief notices of their sources and preparation. By *table liquors*, we mean those prepared by fermentation or distillation; all of them being produced from vegetable substances, containing sugar, or starch, which is converted into sugar before fermenting. Of these liquors, the simplest, and probably the least injurious, are *cider*, made from the juice of the apple; *perry*, from the pear; and *wine*, from must, which is the newly expressed juice of the grape. By the alcoholic fermentation, the sugar previously existing in the juice, is converted into alcohol and carbonic acid; the latter escaping, if the vessel be open, or being condensed, if the vessel be tight and strong, but effervescing when the vessel is afterwards opened, as in the case of Champagne, or bottled cider. If the alcoholic fermentation be not checked, it results in the vinous fermentation; by which the alcohol is converted into vinegar.

Ale, or strong beer, and *porter*, are also fermented liquors, made from malted barley; first rendered sweet by the process of malting, or causing the barley to germinate, and then speedily drying it, before it is fermented. Of the distilled liquors, *whiskey* is made from rye; *rum*, from molasses; *brandy*, from wine; and *gin*, from malt liquors, flavored with juniper berries. The lighter wines, as Claret, Hock, Burgundy, and Champagne, contain from 12 to 17 per cent. of alcohol: the stronger wines, as Port, Sherry, Madeira, and Malaga, contain from 20 to 25 per cent.; and distilled liquors or ardent spirits contain about 50 per cent. of the strongest alcohol. The red, or dark wines, contain more tannin and extractive matter than the white or pale wines; and hence act less speedily upon the animal system. But however tempting their appearance, the fact should not be disguised, that all these liquors act as an unnatural stimulant; and although serviceable occasionally as medicines, their habitual use gradually vitiates the blood, deranges the nervous functions, and causes premature exhaustion and decay.

CHAPTER IV.

VESTITURE.

UNDER the head of Vestiture, we include all those arts which relate immediately to the manufacture of cloth, and preparation of clothing. The name is derived from the Latin, *vestis*, a garment, or *vestio*, I clothe; in reference to its most important application; for covering or clothing the human body. *Clothing* is made of various materials; and the selection is governed partly by their greater or less power of conducting heat. Linen, being the best conductor, forms the coolest clothing in summer; and cotton, in this respect, comes next to linen: while wool, silk, and fur, being the worst conductors of heat, are the best retainers of animal warmth in the winter. The operations of making cloth, are chiefly mechanical; but those of bleaching and dying it, are strictly chemical, requiring a knowledge of the properties of dye stuffs, and the theory of colors. The tanning of leather, is also a chemical process; but the manufacture of garments, including shoes and boots, consists of what are termed mechanical operations. The importance of these subjects to our physical comfort, and their increasing extent, are our reasons for grouping them together, as a branch of Chreotechnics, distinct from other manufactures.

The arts of sewing, spinning, and weaving, appear to have been invented in the earliest times: the former at the expulsion from Paradise; and the two latter probably in ancient Egypt. *Flax*, is supposed to have grown originally in that country, or in Persia; and linen cloth was used by the ancient Egyptians for the sole dress of their priests, and for enveloping the dead after embalming. From them its use was learned by the Jews and Phœnicians; and thence carried into Greece and Italy, long before the Christian Era. *Cotton*, is a native product of India; and there it was first manufactured into cloth, in remote ages. Cotton fabrics were scarcely known to the Greeks and Romans; but they were introduced into Spain by the Arabians, about A. D. 912; and thence the manufacture spread over modern Europe. Cotton was first manufactured in England, about 1641: but the quantity was small, before the invention of spinning and weaving machinery; and was much increased by the invention of the *saw gin*, for cleaning cotton of its seeds, by our countryman, Mr. Whitney, in 1792.

Wool, was, probably, one of the earliest materials used for clothing; being originally worn with the skin of the animal, rudely dressed. It was much worn by the Romans; who introduced its manufacture into England. *Silk*, was first manufactured in China; tradition says, by the empress, Si-ling-shi, about 2700 B. C. Silk fabrics were first used in Rome, only a short time before the Christian Era. The culture of silk, was brought from China to Greece, it is said, by Persian monks, about A. D. 550; and the manufacture extended thence to Sicily, in the 12th century; and thence to central Europe.

The most ancient mode of *spinning*, was by means of a distaff, and spindle; one or both of them held and turned by the hand. This mode was superseded, in later times, by the one thread spinning wheel, still used in spinning linen. The next step, and a great one, in this art, was the invention of the *Spinning Jenny*, by Mr. Hargreaves, in 1767; with which machine, several threads could be spun at the same time. The next invention, that of the *Water Spinning Frame*, in which the thread is drawn out by rollers, though ascribed by some to Mr. Wyatt, was first made known by Arkwright, who took a patent for it in 1769. Mr. Arkwright afterwards connected the carding with the spinning, in another machine, patented in 1795. The last great invention in spinning, was that of the *Mule*, or the Mule Jenny, by Mr. Crompton, in 1779; combining the spinning jenny with Arkwright's improvements; so as to make finer and smoother thread. The invention of the first *Carding Machine*, is attributed to Mr. Paul, in 1748.

The most ancient *looms*, such as are still used for weaving, by the natives of India, had the thread descending vertically from the beam on which it was wound: and the weaving commenced at the lower end, progressing upwards. The horizontal loom, with heddles, to separate the alternate threads, or warp, before inserting the woof, or filling, by means of the shuttle, was of later origin. The first successful invention of the *Power loom*, moving solely by machinery, was by Rev. Dr. Cartwright, in 1785: but this invention was repeatedly modified by others; and was a long time in coming into use. We have no room here to explain how great an influence these improvements in spinning and weaving have exerted, upon the productive industry, not of Great Britain and the United States only, but of the whole civilized world.

Our further remarks on Vestiture, will be distributed under the heads of Linen, Cotton, Woolen, and Silk Manufactures; concluding with some remarks on Felting and Tanning.

§ 1. The *Linen Manufacture*, derives its name from *linum*, the botanical name of *flax*. The flax, after being pulled and rotted, as mentioned under agriculture, is dressed by *breaking*, or passing it between alternate bars, which break the woody stem; then *swingling*, or beating it, to remove the woody fragments; and lastly *heckling*, or combing it, to remove the coarser fibres, and split the remaining bark more finely. It has hitherto been spun only on the one thread wheel: as it requires the peculiar management of the hand, in drawing it. After the weaving, which is usually performed by hand, it is bleached, either by dipping it in ley, and exposing it to the sun; or by the action of chlorine.

Among the linen fabrics, are *sail cloth*, which is coarse and plain; sheeting and shirting, which are finer; *cambric*, which is plainly woven, but still finer, so named from Cambray in Flanders; and *lawn*, which is a sheer cambric, thin and transparent. Linen *diaper*, is woven with figures; one thread crossing two or more at a time; and *lace*, is a network, formerly woven on a cushion or pillow; the thread being wound on bobbins of bone, and netted around pins, stuck in the cushion, whence it is called bone lace. This, when embroidered with the needle, is called point lace; while *bobbin-net* is made with machinery, and usually of cotton. The coarser sail cloth, is made from hemp; much in the same manner as cloth is made from flax; and both materials are wrought into ropes and cordage, on the same principles which are employed in spinning thread.

§ 2. The *Cotton Manufacture*, is now chiefly carried on by the agency of machinery; to which we have already referred. Raw cotton, is derived from the seed pods of the cotton plant, or gossypium. The two principal varieties, cultivated in our Southern States, are the *black seed*, or *long staple*, with long fibres, which are drawn out from the seeds by means of the roller gin; and the *green* *seed, short staple*, or upland cotton, which was of little value before the invention of the saw gin; but is now the most abundant product. The *nankeen* cotton, so named from its natural nankeen color, is a short staple, used only for coarse and domestic manufactures.

In Arkwright's machinery, the cotton, after being picked or batted into a light, uniform mass, and then twice carded, once in the breaker, and once in the finisher, comes from the latter in continuous rolls, called card ends; which next pass through the *drawing frame*, between two pairs of rollers, the second turning more rapidly than the first, by which the ends are drawn out in length. Several of them are then united to form a *sliver*, or untwisted rope, of many strands; which, passing through the roving frame, or *double speeder*, is again drawn and slightly twisted; forming a loose, imperfect thread, called roving. This is transferred to the *spinning frame*, where it is again drawn and twisted, to form a perfect thread. In Crompton's Mule, or mule jenny, the thread is farther stretched, after leaving the rollers, by the spindles being moved backward, while twisting, and thus producing a more even thread. Of the power loom, now used for weaving, we can only say that it performs all the requisite motions, with such steadiness and uniformity, as to make better cloth than can possibly be woven by hand.

Cotton cloth is usually *bleached* by the moist application of chlorine, evolved from chloride of lime, called bleaching powder. *Calico printing*, is performed by passing the cloth over engraved copper cylinders, the incised figures or hollowed parts of which, contain the pastelike coloring matter; while, from the raised and polished parts, the color is scraped away, as the cylinder turns. For *adjective colors*, which will not adhere without a mordant or basis, the cloth is first printed with the mordant, and then dipped in the dye; which is afterwards washed out from the other parts. Madder, and logwood, give a black dye with salts of iron, but a red dye with a mordant of acetate of alumina. Of cotton fabrics, *muslins* are named from Mosul; and *calicoes*, from Calicut; places formerly celebrated for their manufacture. In England, white, or unprinted cotton cloth is called calico: but we give this name to printed cotton, having not more than two colors; and cotton cloth with more than two colors, we call chintz. The name *muslin*, we apply only to the finest cotton cloths; and *gauze*, differs from it, only in being still finer, and loosely woven, making it open, or transparent.

§ 3. The *Woolen Manufacture*, has also been greatly promoted by the modern improvements in spinning and weaving machinery. Wool, is selected according to its softness, fineness, color, and regularity of curling; which curling enables it to yield in length, and hence, like cotton, to be spun mechanically. The short, fine, and curly wool, is used for *broadcloths*, *flannels*, and other fabrics which require fulling to thicken them: and the long, straight wool, or worsted, is used for *camlets*, *bombazines*, and similar fabrics. The wool, by carding, is formed into small cylindrical rolls; which are stretched and spun, first in a *slubbing*, or roving machine, and afterwards in a *mule jenny*, as in the case of cotton. The weaving, is mostly done by machinery; and the fulling, for broadcloths and flannels, entangles, and mats the fibres, on the same principle by which hats are made of fur, in the process of felting. The cloth is then dyed, if required; after which it receives a nap, by being scratched with the teasel plant, to lay its fibres parallel; and it is then sheared to produce an even surface.

Of *carpet weaving*, and other varieties, we have no room here to speak. Woolens are dyed by first scouring them with an alkali or ley; then immersing them in a bath of the coloring matter: and afterwards spreading them to dry. If the coloring matter be of vegetable origin, it is generally an adjective color, requiring a mordant, as in calico printing. To this remark, indigo is a prominent exception; though it is applied in combination with sulphuric acid. The same colors which are used for cottons, as madder, and logwood, quercitron, and indigo, are generally applicable to woolens also. The mineral colors, as orpiment yellow, and chrome red, are generally substantive colors, adhering to the cloth without a mordant.

§ 4. Of the *Silk Manufacture*, we must speak very briefly. The *cocoons*, spun by the silk worm, in which to shelter itself during its transformation, are steeped in water, warm enough to loosen the threads, but not so warm as to injure them: and each cocoon, by unwinding, gives a strand, of which many are reeled and twisted together, to form one thread. These latter operations are now performed by machinery. Of silk fabrics, besides plain silk cloth, *crape* is plain, but loosely woven, and hence open and transparent; *satin*, is woven with one thread crossing two or more at a time; *damask*, is thicker, and woven with figures; *brocade*, the same, only still thicker, and often inwoven with thread of gold, or silver: *gauze*, probably named from Gaza, is a light, transparent fabric, often cross-woven, or with the contiguous threads intertwisting; and *velvet*, is formed by superfluous threads drawn in between the warp and woof, in weaving, but left projecting in loops, which are afterwards sheared off, producing the pile, or close downy surface, formed by the ends of the fibres.

Of *Dress Making*, or the arts of the Tailor, Mantuamaker, and Milliner, though worthy of notice, we have no room here to treat. Modern *hats*, are made by the process of *Felting;* in which the fibres of fur or wool, being rough or barbed in one direction, become entangled, by working or agitating them, when hot and moist, so as to form a matted mass, which is then shaped upon a block. *Leather*, is made by the process of *Tanning:* the skin being first cleansed of hair and flesh, by the action of lime and the beaming knife; then immersed in a vat of oak or hemlock bark, ground fine, and diffused in water. The tannin, or tannic acid of the bark, unites with the gelatin of the skin: and the leather, thus formed, is afterwards *curried*, by oiling, coloring, and smoothing or softening it. Boots and shoes are shaped on a block of wood called a *last;* the upper leather being first applied, and the sole leather fastened to it, by pegging or sewing.

CHAPTER V.

FURNITURE.

In the branch of Furniture, we include the manufacture of the various utensils, and moveable articles, required for housekeeping or personal convenience; and which are not included in any of the preceding branches. The name is derived from the French *fournir*, to furnish or provide; and hence it admits of the extended sense in which the term is here used, in the absence of any other more appropriate term. Thus, we include under it, the manufacture of glass and gems; of porcelain and pottery; of hardware and jewelry; of lamps and mirrors, timepieces, and musical instruments; of cabinet work and carriages; of saddlery and travelling equipments; and of various other minor articles, which hardly admit of rigid classification. These manufactures, though separately they might be overlooked, are, we think, collectively, of sufficient importance to be ranked as a distinct branch of the arts included in the present department.

The invention of furniture, of various kinds, must of course have been very ancient; and nearly coeval with that of the ruder forms of Architecture. Seats, tables, beds, and implements for cooking, would be required as soon as men began to improve their physical condition. Earthen ware, was made by the ancient Egyptians; and the potter's wheel is said to have been invented as early as 1270 B. C. Porcelain, was invented in China, and first introduced into Europe by the Portuguese, in modern times; and the art of making it was reinvented by Botticher of Germany, about A. D. 1706. Glass, according to Pliny, was first made accidentally in Syria, by heating an alkali on the sand. It was ornamented by cutting, as early as A. D. 60; and first used for windows, near the close of the third century. Glass windows were first introduced in England, about 1100; and plate glass was first cast in France, by Thevenart, in 1688.

Lamps, were an early invention; and street lamps were used in Antioch, A. D. 380. The clepsydra, or water clock, was invented in Egypt; and introduced into Rome by Scipio Nasica, about 200 B. C. The invention of clocks with wheels, is attributed to Gerbert, (who was afterwards Pope Sylvester II.) about the year 996. Hook invented spiral watch springs, about 1660; and Harrison's chronometer was completed in 1764. The hydraulic organ, is said to have been invented by Ctesibius of Alexandria; and it was first used in Roman churches by Pope Vitellian, who died in 669. The water probably served to compress the wind, forced into the wind chest at intervals, by a simple bellows, but expelled in a constant current, to produce the sounds. The modern organ, was invented about the year 1300, by the Germans. The harp, and trumpet, were inventions of early times; but the violin appeared about the time of the crusades. The piano-forte, or piano, a great improvement on the old virginal, and harpsichord, was invented by Schroeder of Saxony, about the year 1717.

We shall here distribute the arts of Furniture under the heads of

Vitrefactures; Metallifactures; Horology, and Musical instruments; and Cabinet and Carriage work; with interspersed notices of minor articles.

§ 1. Under the head of *Vitrefactures*, we include glass, pottery, and porcelain; though strictly speaking, the latter are vitrified only on the surface, by glazing. *Glass*, is composed of sand, that is, silex or silicic acid, melted with an alkali, usually potassa or soda, in the furnace of a glass house. *Bottle glass*, is made of common sand and potash; and is colored green by the oxide of iron in the materials. When melted, a portion of it will adhere to the end of a long iron tube dipped in it, and on blowing into the tube, it swells out like a soap bubble, and thus receives its shape. *Crown glass*, used for windows, is made of purer sand and alkali; with a little oxide of manganese to render it quite colorless: and it is shaped by rapid whirling on the end of a tube. *Plate glass*, is of similar composition; and is cast in plates, on large tables. *Flint glass*, contains not only pure sand and alkali, but a large portion of the oxide of lead; which renders it more brilliant, and softer to cut, or rather to grind; as for table glass. The cutting of *gems*, by the Lapidary, is chiefly effected by rubbing them with fine, hard, powders.

Pottery, or common earthen ware, is made like brick; except that the tempered clay is shaped by *throwing*, that is, placing it on a wheel turning rapidly on a vertical axis, and moulding it with the hands, or tools, into a rounded form. It is burnt in *saggars*, or larger vessels, previously burnt, and which serve to protect it while burning. It is often glazed, by throwing salt into the kiln; the soda of which converts its surface into a kind of glass: and, like glass, it may be colored by metallic oxides. *Stone ware*, of a gray color, is made of clay containing less or no iron; and it is thoroughly burned. *White ware*, including Wedgewood and Queen's ware, is made of the finest white clay; and in the former, a portion of flint is added, by which it is partially vitrified throughout. *China ware*, and porcelain, are made of feldspar, finely pulverized, and mixed with kaolin, which is feldspar deprived of its potassa by decomposition. The feldspar melts while burning, and enveloping the particles of kaolin, gives the ware its translucency. It is burnt in saggars, like pottery, forming what is called *biscuit;* which is coated with paste of feldspar, and then burnt anew, to glaze it.

§ 2. Under the head of *Metallifactures*, we include the manufacture of hardware, brassware and jewelry: reserving, however, that of watches, for the following section. By *hardware*, is usually meant that made of iron or steel; as kettles, and similar vessels, of cast iron: but knives, forks, scissors, and the like, made of steel, are collectively termed *cutlery*. The former class, are made of cast iron, by the process of melting and founding: but the latter are shaped from bars of steel, by forging or hammering, either on a plain anvil, or on a block so shaped as to form a pattern. They are then hardened, by plunging them, when red hot, into cool water or oil; and afterwards tempered, by heating them anew to about 500° Fah., by which they are rendered less brittle. Lastly, they are polished, on wheels coated with finely powdered emery; and then properly set or mounted.

Lamps, are often made of brass or bronze; as the *astral lamps;* which are covered with a spreading glass shade, and have the oil contained in a hollow ring, with tubes leading to the cylinder and wick, so that there is no large reservoir to obstruct the light on the table. They are usually *Argand lamps*, having cylindrical wicks, with a supply of air rising through the centre: and the draught is farther promoted by a glass chimney around the flame. The brass, or bronze, is cast, in parts which may be soldered together; and the gilding may be performed by coating the polished metal with an amalgam of gold, which is then heated to drive off the mercury. Gilding on wood, as for the frames of mirrors, is performed by applying gold leaf to a smooth surface covered with whiting, and size, or glue; and afterwards burnishing it, with smooth iron or steel. Gold and silver *plate*, as spoons, cups, and the like, are chiefly made by hammering; as also the minor articles of jewelry, of which we have no farther room to speak.

§ 3. Of *Horology*, and musical instruments, our notice must be very brief. The motion of *clocks*, is produced by means of *weights;* and that of watches and chronometers, by means of the *main spring;* the pendulum in the former, and the hair spring in the latter, serving merely to regulate and retard the motion, by distributing it through a longer time. In common clocks, the pendulum, in connection with the scapement, acts upon the scape wheel, which rotates once in a minute; and, by means of wheels and pinions, this wheel governs the motion of the hands. In *watches*, the hair spring acts on the balance wheel, which performs the same office as the scapement in clocks. In the remaining parts of the machinery, clocks and watches are very much alike; except in regard to the striking part of clocks, a description of which would transcend our present limits. *Chronometers*, differ from watches, chiefly in being larger, with contrivances for keeping time more accurately.

Musical instruments, are usually classed as either *stringed*, or *wind* instruments; and the latter are blown either by the mouth, or by machinery. The *violin*, or fiddle; the *viol*, or tenor; the *violoncello*, or bass; and the *violono*, or double bass, are all played with a bow; and are made of thin plates of wood, moulded by pressure. Similar to these, are the *lute*, and *guitar*, which are played with the fingers. The *lyre*, and *harp*, are also played with the fingers; but the lyre has a body, and the harp only a frame; with strings of animal membrane. The *piano*, has wires for strings; with keys, acting on levers, and so arranged that the fingers striking the keys, cause the wires to be struck and sounded. Of mouth and fingered instruments, the *flute*, *clarionet*, and *bassoon*, are made of wood, turned in a lathe; but the *trumpet*, *bugle*, and *horn*, are made of brass or silver. The *organ*, the grandest of musical instruments, is an assemblage of pipes, opened or closed by the action of the keys, and receiving air from the wind chest, so as to sound when opened. Pulsatile instruments, are formed like the *drum*, and *tam-*

bourine, of tightly strained discs of animal membrane; or, like *bells*, and *cymbals*, of sonorous metal.

§ 4. *Cabinet*, and *carriage work*, are similar in their operations, and hence are here associated. A *cabinet*, in its original sense, is a large bureau, or chest of drawers: and cabinet work includes the making of wardrobes, sideboards, sofas, tables, chairs, and other similar articles. It consists chiefly of joinery; and the frames, made of common wood, are often *veneered*, or overlaid with thin leaves of mahogany, or other rare wood, fastened with glue, and then polished and varnished. Cabinet work is sometimes associated with *upholstery*, or the preparation of bedding, curtains, carpeting and similar articles; the materials of which belong to the branch of Vestiture. These arts acquire increased importance from the principles of taste on which their successful practice depends.

Among the different forms of *Carriages*, the *coach* is entirely covered, and has two or more seats, for two or more persons each, facing the centre. The *barouche*, has a folding, or chaise top; but with two similar seats. The *chariot*, and post coach, have only one seat, for two or more persons, inside; but, like the preceding, are drawn by two or more horses. The *phæton*, resembles a chaise body set on four wheels: the *dearborn*, or carryall, has two seats, with flat top, and curtains; and the York waggon has a single seat, without a top; but they all have four wheels. The *curricle*, is a two horse chaise: the *gig* differs from the common chaise, in having no top; and the *tilbury*, or buggy, is a lighter kind of gig. The *sulky*, has also two wheels, but contains a seat for only one person. The *cutter* is a lighter kind of sleigh, for winter use; moving on runners.—Of the manufacture of saddles, harnesses, trunks and like articles, made chiefly of leather, we can here take no farther notice.

CHAPTER VI.

COMMERCE.

In the branch of Commerce, we include the exchange of commodities, of every kind; with the principles and considerations by which such exchange is regulated. The name is derived from the Latin, *commercium*, having the same signification; and it is synonymous with *trade*, or *traffic;* comprehending the whole profession of the merchant. It has close relations with Political Economy, particularly on account of its connection with banks and currency, as supplying the medium of exchange: but we consider it as still more closely related to the productive arts, of which we are here treating. This art requires an extensive knowledge of both artificial, and natural products, in order to be able to judge of their quality, and to estimate their value. Indeed, there is no profession in which we think extensive and varied knowledge can be more useful than to the merchant, who deals in all kinds of commodities, and with all classes of men. This profession has done much to foster the arts; and by bringing the nations acquainted with each other, it has greatly promoted the advancement of knowledge, and the civilization of our race.

Commerce must have originated as soon as men had a superfluity of any commodities, and voluntarily exchanged them for others. Thus, we read of the Ishmaelites carrying spices, balm, and myrrh, from Gilead to Egypt, as early as 1729 B. C.; and the transportation of goods by caravans, was doubtless still more ancient; the merchant accompanying his goods, to protect them. The Phœnicians, having great facilities for navigation, and much skill in that art, became the first great commercial nation; and so continued, till the conquest of Tyre, by Alexander, 332 B. C. The use of gold and silver, as a circulating medium, was of great antiquity: but these metals were first coined into money, by Phidon, king of Argos, about 870 B. C. Greece was never a commercial nation; but Rome acquired an extensive commerce, by rendering the conquered nations tributary to its wants; till the removal of the empire to Constantinople made that city the great emporium of the civilized world.

In the dark ages, Commerce declined; owing partly to the deficiency of productions, and partly to the insecurity of property. This latter circumstance gave rise to the famous *Hanseatic League*, of cities confederated for mutual protection. This league, in the year 1200, comprised no fewer than 72 cities, in Germany, Denmark, England, Holland, France, Spain, Portugal, and Italy: and it contributed much to the revival of trade. At that period, Venice and Genoa were the chief trading states; and they carried on the overland commerce with the Indies, until the discovery of the southern passage to those regions, in 1498. This event gave that trade chiefly to the Portuguese: but it was wrested from them by the Spanish, French, and English; and secured chiefly to the latter by their conquests in Hindoostan. The commerce of England has grown with her manufactures and naval triumphs; chiefly since the days of Queen Elizabeth. That of the United States has also increased with great rapidity; and now extends to every habitable and accessible region of the globe.

We shall offer some farther remarks on this branch, under the heads of Principles of Commerce; Sources of Commerce; Cambistry, including weights and measures; and Book-keeping.

§ 1. The *Principles of Commerce*, are the data which should govern the merchant, in the management of his business. His first great object, after making business arrangements, would seem to be, to discover what line of trade, or what class of articles, would afford him the greatest profit; having reference to the comparative safety, as well as the nominal proceeds of his investments. His next step would be to ascertain where the articles sought can be procured the cheapest, and where they will bring the highest price. Or, having a certain article in his possession, the problem may be to find where it can be disposed of to the greatest advantage, receiving any saleable articles in exchange. The article transported, is generally worth more in the place where it is sold, than the merchant receives in return;—as few purchases are made except for the sake of gain;—and yet the merchant receives that which is worth more to him than the goods sold; thereby showing how Commerce may be regarded as one of the productive arts.

An important topic, for the merchant, is the use and abuse of *credit*. By selling goods on credit, he may make greater sales, and at higher prices: but, without security from some trustworthy person, that payment shall be made, he may in the end lose all his profits, and his goods likewise. The asking, and giving of security, is a delicate matter: but we hold that no person should ever become bondsman for another, to such an extent as would ruin or severely distress him, if the principal debtor should fail; neither should the merchant ever risk his goods, without security, to such an extent as would ruin or greatly distress him, if payment should never be made. With these restrictions, the credit system may, we think, to a certain extent, be beneficial to all the parties concerned. But we would insist, that no one risk should be run, nor combination of risks, either in the way of credit or speculation, so great as would cause ruin or failure of obligations, should the risk be unsuccessful. Against shipwreck and fire, security may be obtained by means of insurance: and where the risk involves a large proportion of our capital, this security should never be neglected.

§ 2. The *Sources of Commerce*, are to be found in the numerous articles of natural or artificial production, which have an exchangeable value among mankind. Many of these articles, require particular care and skill for their preservation; as well as a knowledge of their quality and relative value: but these are subjects which transcend our present limits. We have barely room to enumerate a few of the most important articles of commerce; naming the countries where they are mostly obtained, and those where they are in greatest demand. *Cotton*, is raised chiefly in the southern United States, and in India and Egypt. It is carried chiefly to Great Britain, France, and the northern United States, where it is manufactured into thread and cloth; partly for home consumption, and partly for exportation to all other parts of the world. *Wool*, is extensively grown and manufactured in Great Britain, Germany, and the northern United States: *silk*, is chiefly produced in China, southern Asia, and southern Europe; and *linen*, is chiefly produced in central Europe, Russia, Holland, and Ireland.

Of breadstuffs, *wheat*, is carried from our Western States to the Atlantic cities; and flour is exported to Europe and South America. Great Britain receives *flour*, from Russia, Germany, and the United States; and *rice*, from the latter country, and the East Indies. *Beef*, and *pork* are exported from our central and western States to the West Indies and South America. *Sugar*, is exported to Europe chiefly from the West and East Indies; and refined sugar is exported to various parts, from the United States. France and Germany supply themselves, to a great extent, with sugar from the beet; and those countries, together with Portugal and Italy, furnish the chief supplies of *wine*, to the rest of the world. *Tea*, is produced almost solely in China; but *coffee* is raised in the West Indies, Brazil, Arabia, and the East India Islands. These commodities, and the *spices* of the East and West Indies, are distributed among all the civilized nations. The greatest produce of *tobacco*, is from Virginia, and the other Southern States of our Union.

Of manufactures, besides cloths, already referred to; *iron*, is chiefly made in Great Britain, Sweden, Germany, and the United States; and in Great Britain it is most extensively wrought into hardware and cutlery. *Copper*, is chiefly produced in Sweden, Germany, and Great Britain; *tin*, comes from Cornwall in Great Britain, and Banca in the East Indies, as also from Germany; and *lead*, is produced in England, and Germany; but abounds in the western United States. *Gold*, and *silver*, are obtained from South America, Mexico, and Russia: silver also from Germany; and gold from the coasts of Africa and the East Indies, and from the southern United States. *Salt*, is mined in Poland, and manufactured in the West Indies; as also, both from sea water, and salt springs, in our own country. *Coal*, is mined most abundantly, in Great Britain, and the states of Pennsylvania, and Virginia.

§ 3. Under the head of *Cambistry*, we include the subjects of exchange, coins, and currency, to which the term is strictly applicable; and the kindred subjects of commercial weights and measures. Money, like other commodities, has its fluctuations of value, depending on its relative abundance or scarcity. A silver dollar, at the present day, is worth far less than it was one or two centuries ago; that is, it will purchase a smaller amount of commodities, except such as have also become cheaper, owing to new supplies, or new inventions. The currency of Great Britain, is reckoned in *pounds sterling*, (marked £;) which are subdivided into shillings, pence, and farthings. A pound sterling is at present worth about $4·87; but a person would be obliged to pay about $5·00 in New York for a *drauft*, or bill of exchange, on London, which would entitle him to receive one pound sterling from the London banker on whom it was drawn; the difference, or rate of exchange, varying with circumstances.

The English *sovereign*, is a gold coin worth just one pound, or $4·87: the *guinea* is worth $5·11; the *crown*, a silver coin, is worth about $1·10; and the *shilling*, about 22 cents. The Russian or German *ducat*, is worth $2·30; the gold ducat of Venice $1·45; and the silver ducat of Venice or Naples, about 78 cents. The French *crown*, (ecu,) is worth $1·07; the Austrian, 96 cents; and the Sardinian, 87 cents. The French *five franc piece*, is worth 93 cents; and the old *Louis d'or*, or gold Louis, $4·58. The German *florin*, of gold, is worth $2·02; that of silver, 30 cents; and the Dutch florin, 40 cents. The Italian *zecchin*, is worth about $2·30; and the Venetian *pistole*, $3·88. The old Spanish *doubloon*, of 8 crowns, is worth $15·57; that of 4 crowns, $7·78; and that of 2 crowns, $3·88. The Spanish *real* of 2, or *peseta*, is worth 20 cents; and the *piastre*, $1·00. The Turkish *piastre*, of 40 paras, is worth 37 cents; the *zecchin*, $1·35; and the *rouble*, 9 cents; but the Russian *rouble*, is worth 85 cents. The gold *rupee*, of Hindoostan and Persia, is worth, $7·10; the silver rupee, about 45 cents; and the Madras gold *pagoda*, $1·84.

Cloth is measured by its length, that is, by *linear measure;* its breadth being easily known. Expressing linear measures in feet and decimals, the English *yard* is equal to 3·000; the English ell, 3·75; the French ell, 3·861 ; the Amsterdam ell, 2·223; the Venice ell, 2·089; and the Vienna ell, 2·557 feet. Grain is measured, in England and the United States, by the *bushel;* which contains $2218\frac{1}{5}$ cubic inches; and is sub-divided into eight gallons, or 4 pecks. The *gallon*, thus determined, is also used for measuring liquids; and is subdivided into 4 quarts, 8 pints, or 32 gills. Commodities not easily measured, are sold by weight; the pound being the standard unit. The *pound Troy* contains 5760 grains, divided into 12 ounces; and is used by druggists and jewellers; but the *pound Avoirdupois*, more generally used, contains 7000 grains, divided into 16 ounces; the *grain* being our smallest unit of measure.

§ 4. *Book-keeping*, is the art of keeping accounts; so as to show the purchases and sales, debts and dues, and the state of the cash, stock, and other pecuniary affairs, of the person or party concerned. The simplest mode of Book-keeping, is that by *single entry;* in which we devote a page of the *Account Book* to each individual with whom we have an account; placing his name at the top, and charging him in one column, headed *Debtor*, (Dr.) with all articles delivered to him; while in the other column headed *Creditor*, (Cr.) we give him credit for all money or other articles received from him. The accounts may be at first roughly entered in the *Waste Book*, miscellaneously as they occur; and afterwards neatly copied into the Account Book; this latter process being called posting the accounts.

The method of Book-keeping by *double entry*, sometimes called the Italian method, consists essentially in making two entries of every transaction, in different books, and in different forms; so that the one may check the other, to aid in detecting errors. Thus, the *Account Book*, may show our account with different individuals, as in the preceding method; while the *Ledger*, shows our dealings in different articles, considered separately; each article being made debtor to him from whom it was received, and creditor against him to whom it was sold. The *Cash Book*, may in like manner show all our receipts and payments of money: and the *Journal*, or Day Book, may be made debtor, in one column, to all receipts whatever; and creditor, in another column, to all deliveries, or payments made each day. From all these books, the balance sheet may be formed; exhibiting the amount of our transactions, and the state of our affairs. Various other books, and forms, are used in Book-keeping; which we have no room here to notice.

XV. DEPARTMENT:

MACHETECHNICS.

In the department of Machetechnics, we include the Arts of War; or the management of belligerent operations, both by land and by sea. The name is derived from the Greek, μαχη, a battle, or engagement; and τεχνη, an art: this being the most appropriate term that we can propose; having regard to brevity, euphony, and symmetry of the nomenclature. War is often termed a *science;* and, indeed, it involves many scientific principles, some of which are peculiar to itself. But it is also termed an *art:* and as its essence consists in action, we regard it as still more closely connected with the arts, than with the sciences; and have located it accordingly. It depends especially on Mathematics, Mechanics, Chemistry, and the Arts of Construction; requiring also, in the field, a practical knowledge of the Geography or Topography of the region which is the seat of war-like operations. A military, or naval officer, therefore, should have an extensive and liberal education; and should possess an active, inventive mind, with a strong physical constitution.

The Art of War, has occupied so prominent a place, in the records of the past, that a general acquaintance with its operations may be deemed essential to the understanding of History; whether we regard the facts alone, or their causes and consequences. The fate of nations, and the civilization of the world, have more than once hung upon the result of a siege, or a battle; in which, the fall of a commander, or even of the horse which bore him, might turn the scale of victory. Such contingencies should remind us that the battle is not always for the strong; though they afford no argument against the advantage of strength devoted to a good cause. But, if such be the influence of an able commander, so far as human agency is concerned; the art and science, aside from the energy and courage, by which that influence is maintained, are surely worthy of being studied, by the statesman and philosopher.

Much has been written on the use, and the abuse of the Arts of War. We think that they have done much good, as well as harm, in the world; the evil passions of men having been made subservient by their means, to higher and divine purposes. Thus, the Arabian conquests in Spain, brought the oriental arts and sciences into Europe; and the British empire in India, however wrongfully obtained, will, we trust, be the means of rescuing that wide region from the most abject thraldom of superstition and vice. Often, too, have defensive wars been the safeguards of nations; protecting their liberty, or even their existence, from barbarous or ambitious foes. Such wars preserved Europe from the grasp of the Saracens; and secured to our own fair country the blessings of civil and religious freedom. For such sacred purposes, and such only, do we think that these arts should be practically studied; till the time shall come, when the sword may safely be beaten into the ploughshare, and the spear into the pruning hook, in token of final, universal peace.

Although war is one of the greatest evils that can befall a nation, whether through its own fault, or the fault of another, still it is one for which we ought to be prepared; even as we would prepare to defend ourselves against personal violence, in a land where no laws could protect us. Nations, as well as individuals, may do wrong: but where is the authority to arrest them, or the court to give sentence? They may enter innocent lands, with fire and sword, ravaging and plundering; but who will shield the injured party, if it make no effort in its own defence? The hand of Omnipotence, will it be said? No: the Deity works by means; and requires us to use the necessary means for self-preservation. Would the advocate of unconditional peace consent to abolish all law in the land, and let the robber and murderer go free? Or would he offer no resistance to a personal attack; especially if there were no laws to redress him? Such, however, must be his conduct, in order to be consistent with his principles.

Doubtless it is our duty to avoid war, as far as lies within our power, by giving no cause for just complaint, on the part of other nations. The great apostle of our Saviour says, "If it be possible, as much as lieth in you, live peaceably with all men." But this doctrine is evidently different from that of unconditional submission; inasmuch as it implies that there may be cases where we cannot thus live peaceably, except by bowing our necks to oppression. How far we ought to suffer wrong, before taking arms in offensive war,—how great should be the provocation to justify the first step,—it is not for us to decide: but to defend ourselves, when assaulted, is manifestly a necessary right, however painful may be its exercise. While, therefore, we rejoice that the more just and humane policy of nations is removing many of the causes of war, we still think it a duty to be always prepared to resist aggression, as the surest way to prevent its being attempted. The project of a Congress of nations, to settle international difficulties, is a noble one; and it would be worthy of our own Congress to propose the subject to the leading foreign states. But we have doubts of its practicability; and especially of the potency of such a Congress, however wisely constituted, to secure universal peace; and hence we would still adopt the precept of our immortal Washington; "In peace, prepare for war."

War has been defined, "the act of compelling an opponent to submit to one's will:" but it might with equal propriety be styled the means of self-redress, and self-defence. Armies, fortifications, and fleets, are the great instruments of warfare: battles are the occasions, and blood the price of victory. Armies require provisions and weapons, organization and instruction, and brave men and skilful commanders, to give them a full chance of success: and should they be too feeble to cope with the enemy, or unsuccessful in the onset, they require fortifications to strengthen them, and, at the expense of being kept stationary, to enable them to withstand the foe. Fleets require all these accessories; their own good ships besides: and, still more than armies, they are dependent upon wind and weather; which sometimes prove their most dangerous antagonists. In estimating the probable results of warlike operations, great allowance must be made for the various casualties to which they are exposed. This difference has been happily expressed by an able writer on this subject, who calls it the "friction of war;" a deduction analogous to that which must be made from mechanical forces, in allowing for the friction of machinery.

The Arts of War are mostly of very ancient origin; as shown by the Jewish Scriptures, and Egyptian Monuments; which contain numerous records and representations of battles and sieges. The weapons of the early ages, were of the most simple kind; to which their rude tactics and fortifications corresponded: but in the days of the Greeks and Romans, these arts had made considerable progress; and, accordingly, they invented weapons more complicated and powerful, which occupied the place of our modern artillery, in naval as well as in agral warfare. The greatest change that the arts of war have ever undergone, is that resulting from the invention and general introduction of fire arms; by whose unseen force the bravest general, or the strongest soldier, is alike exposed with the feeble and the pusillanimous. This invention has enabled intellectual skill and science to resist more effectually the impetus of mere physical force; though such force is still essential to the labors and fatigues of war. The changes hence introduced in the different branches of the military art, will be farther explained in the following chapters.

We proceed to give some general ideas of Machetechnics, under the branches of Hoplistics; Fortification; Geotactics; Strategy, or Grand Tactics; and Navitactics, or Naval Warfare.

CHAPTER I.

HOPLISTICS.

We propose the name Hoplistics for that branch of the Arts of War, which relates to the arms, ammunition, equipage, and provisions, required for military operations. The name is from the Greek, ὁπλιζω, I arm, equip, or provide; and this from ὁπλα, arms or weapons.* In this branch, we would include the duties of the *Ordnance Corps*, in our own service; or the construction and repairs of arms, and the preparation of ammunition; in armories and arsenals, as well as in the field. Here also we would describe the duties of the *Quarter Master's Department*, in procuring, preserving, and distributing equipage and ammunition; and those of the *Commissariat*, or *Purchasing* and *Subsistence Departments*, in furnishing clothing and

* Ampère adopts the term Hoplismatics, (Hoplismatique); which he makes to include both Hoplistics, as above defined, and Tactics, in all its divisions.

provisions; including forage, or grass, hay, and provender, for horses. The arrangements of the *Medical Department*, so far as relates to fixtures and supplies, may also be referred to this branch: and the importance of these subjects, collectively, will doubtless merit for them a distinct place, among the branches of Machetechnics.

The first weapons used by mankind, for offence or defence, were probably the simple *club*, and the *stone;* which latter soon acquired new force, by being hurled from the *sling*. Next to these, in antiquity, appear to have been the *sword*, of which the first mention is found in the paternal prediction to Esau, (Gen. xxvii. 40); the *bow* and *arrows*, first alluded to in Jacob's prediction concerning Joseph, (Gen. xlix. 23–4); the *spear*, first referred to in the Lord's direction to Joshua, (Josh. viii. 18); and the *dart* or *javelin*, used for hurling at the foe; of which the earliest mention is found in the record of Absalom's death, (2 Sam. xviii. 14); though it was used at a much earlier period. *Battle axes*, and *scythes*, were also used offensively by the Persians; the latter being sometimes attached to the axles of their chariots, projecting on each side. In place of artillery, the Greeks and Romans used the *catapult*, resembling a large crossbow, for throwing arrows; and the *balista*, or onager, consisting of one or more levers, impelled by twisted ropes, for hurling stones; sometimes in battles, but chiefly in sieges. The *scorpion*, used by the Romans, for throwing poisoned arrows, appears to have resembled the catapult, in its construction.

Defensive arms were generally used, in ancient times, for the immediate protection of the body. Of these, the *shield* was the most extensively used; though of varied form and construction. The Grecian shield was generally circular; but the Roman *buckler* was cylindrical, or nearly rectangular. The principal parts of a suit of armor, were the *helmet*, or headpiece, sometimes made of leather, but oftener of iron or brass; with or without a *visor*, to cover the face, excepting the eyes: and the *breastplate*, for protecting the breast; which, if it covered the back also, was called a *hauberk*, or habergeon, the same as the modern *cuirass:* or, in place of these last, a *brigandine*, or coat of mail, was sometimes worn, extending downward over the whole body. Besides these most essential parts, there were occasionally worn *vambraces*, for protecting the arms; *gantlets*, for the hands; *cuisses*, (cuishes), or *tasses*, for the thighs; *greaves*, for the legs; and *shoes*, of tin or iron, were sometimes worn upon the feet. Armor was sometimes made of small plates, overlapping like scales, and constituting *plate mail;* but sometimes it was formed of small rings, linked together, and hence called chain mail. The armor of the middle ages continued nearly the same as that of the ancients: the *lance* being the favorite weapon of the knights; and the *pike* that of the common soldiers; until after the introduction of fire arms.

The invention of *gunpowder*, has been attributed by some writers to the Chinese, and by others, to Roger Bacon, about the year 1280: but the discovery of its use in gunnery, though assigned by some authorities to Anelzen, (Anebren, or Antliz), belongs, we think, to *Barthold Schwartz* of Mayence, in 1320; and is said to have been occasioned by the accidental explosion of the materials, throwing the pestle out of a common mortar. *Fire arms*, appear to have been first used by the Venetians, in 1330; and by the English at the battle of Cressy, (Creçy), in 1346. The first pieces, properly called *culverins*, or *bombards*, were so light as to be carried by hand; and most of them were made of bars of iron, or even staves of wood, bound together like casks, with iron hoops. The projectiles were of stone or lead, until the year 1400; when cast iron balls were first used; and cannon began to be constructed of enormous size: some of them being upwards of 20 feet long; and others of more than 2 feet calibre. It was at length found that cannon of moderate dimensions were more serviceable; such as are now used.

The primitive culverin, by slightly reducing its dimensions, became the *arquebus*, or harquebuss; a hand gun, which was fired by a match, while resting on a staff thrust into the ground for support. The contrivance of a *lock*, to fire it, appears to have been made about the year 1520, when it took the name of *matchlock;* and this weapon, being farther diminished, about 1630, became the modern musket. The *plug*, or wooden handled *bayonet*, was added about the year 1647; but the socket bayonet, which admits of firing while it is fixed, was not invented until 1700, at Bayonne; soon after which, the pike was entirely superseded. The *pistol*, was invented at Pistoiia in Italy, about the year 1570; and the *carabine*, by constructing it with a spiral grooved bore, became essentially the modern rifle, about the year 1720. The invention of *bombs*, or shells, is attributed to Prince Pandulf Malatesta, about the year 1450: but large pieces, called *mortars*, were used somewhat earlier, for throwing stones, or heated balls. Bombs were first used in France, by Malthus, in 1634. The *coehorn*, a small mortar, was invented about 1670, by Coehorn, a Dutch engineer: the *howitzer*, appears to have been invented in Germany, about the year 1690; and the *carronade*, a short gun, of large calibre, was first made at Carron, in Scotland, in 1774.

Our farther remarks on Hoplistics, will be distributed under the heads of Ordnance; Ammunition; and Equipments.

§ 1. The name *Ordnance*, is applied to every kind of cannon, or heavy fire arms, whether for land or sea service: but the duties of the ordnance department, at least in our own service, extend to the inspection and preservation of small arms, and weapons of every kind; as well as to the preparation of ammunition, treated of in the following section. The term *artillery*, is also applied to heavy guns; but generally in reference to the land service, and including also the troops by which the guns are manned. The principal parts of any cannon, or piece of ordnance, are the knob and neck of the *cascable*, at the rear end; the breech or base, and *base ring*, behind the vent; the *first reinforce*, extending from the vent, about one-third of the length, to the first reinforce ring; the *second reinforce*, or middle part, extending forward to the second reinforce ring; the *dolphins*, or handles; the *trunnions* or pivots, on which the piece rests, with their *rimbases*, strengthening and connecting them with the piece, and, lastly, the *chase*, or forward part, including the astragal or ring, and the *tulip*, or swell, the front surface of which is called the *face*, surrounding the *muzzle* or mouth. The interior cavity is called the *bore;* the diameter of which is the *calibre* of the piece.

A light brass *six-pounder*, carrying iron balls of six pounds in weight, has a calibre of $3\frac{2}{3}$ inches; and is usually made about 17 calibres, or 5 feet long; weighing about 6 cwt. Mountain pieces, of small calibre, are sometimes made shorter in proportion; and battering pieces, for sieges, are often made longer; the weight, in this case, being no serious objection, and the force of the powder being rendered more fully available. The limits of length, for guns, are from 11 to 26 calibres. A brass *twenty-four-pounder*, has a calibre of $5\frac{5}{8}$ inches, and is about 8 feet long; weighing about 42 cwt. A twenty-four pound *carronade*, would be about $4\frac{1}{2}$ feet long; and weigh only 13 cwt. A brass *howitzer*, of $5\frac{5}{8}$ inch calibre, is nearly 3 feet long, and weighs nearly 8 cwt.; this kind of cannon being used for firing shells horizontally; shells which explode like bombs. A brass *mortar*, of 10 inch calibre, is about 33 inches long, and weighs about 10 cwt.: but mortars of the same calibre, for sea service, are made far heavier.

The best iron cannon, are cast entirely solid, with the muzzle upward, in a vertical mould formed in the ground: the melted metal, from the different furnaces, flowing down a lateral passage, and entering at the bottom of the mould; by which arrangement the slag rises more completely, and the metal is more pure. The interior is then bored out, from the solid mass, by means of powerful machinery. The carriage, for field guns, consists of two *flasks*, framed to the axle tree, and connected by *transoms*, the breast transom at the front end; the pointing transom at the base of the gun: and the *trail transom* at the rear end or trail of the carriage, which, during the firing, rests upon the ground.* When travelling, the trail is raised and rests upon the *limber*, which resembles the forward wheels, axle, and tongue of a common waggon: the gun then pointing to the rear. *Garrison*, and *sea coast carriages*, also consist of two *flasks*, supporting the gun between them, resting upon its trunnions: but, instead of wheels, they have small trucks, to allow of their recoil; and they are placed on a *traversing platform*, to admit of their being pointed to the right or left. Mortars, are supported on a heavy bed, or platform, moveable only by handspikes, or mechanical powers. Of *small arms*, and their construction, it will be unnecessary here to speak.

§ 2. The term *Ammunition*, properly signifies the various materials which are used in loading fire arms: but, in a wider sense, it may comprehend various other combustibles, used in warfare; the preparation of all which constitutes the art of *Military Pyrotechny*. *Gunpowder*, is a mechanical mixture of nitre, sulphur, and charcoal; which owes its efficiency to the sulphurous acid, carbonic acid, and other gases, which it generates in exploding. That which is used for war, generally contains six parts by weight of nitre, to one of sulphur, and one of charcoal. The purified and pulverized materials,

* In the more recent gun carriages, the flasks, called *cheeks* are shortened; and a piece of squared wood, called the *stock*, is inserted between them, the curved extremity of which forms the trail.

are first mixed intimately, in a dry state; then moistened, and ground in the powdermill; then granulated, or shaped into grains, by being passed through a parchment sieve; next dried, by exposure to moderately heated air; and finally glazed, by the rubbing together of the grains, in a revolving barrel or cylinder. Many precautions, and the greatest care, are necessary, in this manufacture, to avoid dangerous explosions.

The name *shot*, is applied only to solid balls, used in fire arms. Round shot, are single balls; and when attached to a bag, containing a charge of powder, to facilitate the loading, they are called *cartridges*. Case or canister shot, are small balls enclosed in tin cases, but scattering when the cases burst: and *grape shot*, are similar balls, placed around an iron stem, and fastened there by a coat of canvass and twine, resembling a bunch of grapes. *Shells*, are hollow balls, filled with powder, and sometimes containing small missiles; being intended to burst, as they strike, and scatter their fragments or contents. The smaller shells are fired from howitzers, which are mounted like guns: but the larger shells, or *bombs*, are thrown in an elevated direction, from mortars. Shells are exploded, by means of a *fuse*, driven into a hole on one side, which must be outermost, in loading. The fuse is ignited, by the firing of the piece; and burns gradually, for a time depending upon its own length, before it explodes the shell. A *grenade*, is a small shell, to be thrown by hand; and a *petard*, is an iron cone, charged with powder, and designed to break open a gate, by being driven into it, and then exploded. These articles are transported in *caissons*, or waggons of peculiar construction designed for this service.

Port fires, are long tubes, made of paper, and compactly filled with a mixture of nitre, sulphur, mealed powder, (powder finely ground,) and antimony, or steel filings; their chief use being to fire cannons; as they will burn even in moist places, or in the rain. *Slow match*, for retaining fire, consists of hemp or cotton rope, soaked in a strong ley, which contains a small portion of nitre. *Quick match*, for setting off fire works, is make of cotton thread, first saturated with nitre, and then dipped in a mixture of alcohol and mealed powder, of the consistence of cream; out of which it is reeled, and afterwards dried. *Fuses*, for firing shells, are wooden tubes, filled with a composition of 4 parts of nitre to one each of sulphur and mealed powder; and so rammed, or driven, that one inch of it may burn in five seconds. *Rock fire*, is a mixture of powder, nitre, sulphur, and sometimes rosin and iron filings, used in shells, carcases, and incendiary balls, to set fire to buildings or ships. *Light balls*, are intended for illumination; and when armed with loaded pistol barrels, grenades, and the like, to prevent the enemy from extinguishing them, they are called *fire balls*. Smoke balls, are used for filling mines with smoke; and *thundering barrels*, filled with explosive materials, are employed in defending forts against an escalade.

§ 3. Under the head of *Equipments*, using the term in a general sense, we include the various other portable articles, besides arms and ammunition, required for warlike operations on land; such as camp equipage, baggage waggons, and horses, clothing, provisions, and forage.

To the *Quarter Master General*, and his assistants, belong the erection or procurement, and assignment, of store houses, for supplies; quarters, for the officers; and barracks, for the men; the purchase of fuel, forage, horses, and teams; the transportation of troops; and the transportation, and distribution of the arms, ammunition, and other articles required for military service. Each individual is charged with the articles delivered to him; and held responsible therefor; until they are returned or finally accounted for. The Quarter Master's department thus becomes the responsible medium, by which supplies are transported for the Ordnance, Subsistence, Purchasing, and Medical departments, to the places where they are required for use. The Quarter Master on duty in the field, is also charged with laying out the space for encampments, and assigning quarters to the several troops; though the works of defence around the encampment are planned and executed by an Engineer. Both of these officers should therefore understand the principles of *Castrametation*, or the laying out of camps; both in regard to convenience and safety. The general *parade ground*, just in front of the color line, usually extends across an encampment nearly centrally: and in rear of it, the tents are arranged in *rows*, running back perpendicularly, with intermediate spaces or streets for company parade grounds; the officers' tents being in the rear.

To the *Commissary General of Purchases*, belongs the purchase of tents and other camp equipage, and of clothing for the troops; except in special cases, otherwise provided for: and to the *Commissary General of Subsistence*, belongs the procuring of provisions, for the use of the troops. These supplies are often procured by contract; or else by miscellaneous purchase, wherever they can be obtained. Provisions are usually dealt out to troops in *rations*, or daily allowances; which are fixed by regulation, based on the results of experience. A ration, in our army, at present consists of 12 ounces of pork or bacon, or 20 ounces of fresh or salt beef; 18 ounces of bread or flour, or 12 ounces of hard bread, or 20 ounces of corn-meal; and at the rate of 8 quarts of peas or beans, (or 10 pounds of rice in lieu thereof,) with 4 quarts of vinegar, 6 pounds of coffee, 12 pounds of sugar, 2 quarts of salt, 4 pounds of soap, and 1½ pounds of candles for every hundred rations. The duties of the Medical Department, are entrusted to a *Surgeon General*, aided by Surgeons and Assistants; who have charge of the medical stores, including hospitals and hospital tents; and who attend the sick and the wounded. The Pay Department, is under the supervision of a *Paymaster General;* from whom the several Paymasters receive their funds, and to whom they render their accounts.

CHAPTER II.

FORTIFICATION.

Fortification, is that branch of Machetechnics which relates to the construction, armament, attack and defence of forts, and other works; designed for strengthening an army, or serving as points of support. The name is from the Latin, *fortis*, strong; and *facio*, I make; and in an extended sense of the term, it may be regarded as synonymous with *Military Engineering*. The duties of the Corps of Engineers have been extended not only to the construction and warfare of forts, properly so called; but to the construction of roads and bridges, for military purposes; and the making of surveys and reconnaisances, preparatory to military operations. (p. 447). These latter duties are now entrusted, in our own service, chiefly to the Topographical Engineers: and indeed both of these corps require to be well acquainted with the arts of construction and conveyance, treated of in a preceding department. A *fort*, is a strong enclosure, serving to protect a body of men within it, who are called its *garrison* from an enemy without. It may be useful as a place of refuge, for a feeble or defeated army; but is oftener required to enable a few troops to defend an important position, which would otherwise require a much larger number.

The most ancient mode of fortification, seems to have consisted in building a *wall*, around the city or place to be defended; either with or without a *ditch*, or moat, on the exterior. This method was practised by the Canaanites, at least 1500 B. C. The principal ancient improvement on this construction, was the addition of *towers*, at small intervals, along the wall, and slightly projecting therefrom; both to strengthen the wall, and to enable the besieged to see and defend the exterior foot of it; or, in military language, the towers were said to flank the walls. Such fortresses, were attacked, by undermining the walls; or by building *mounds*, as high as the walls, and gradually carried forward to meet them; or by *moveable towers*, advancing on wheels, and overlooking the place; or by using the *battering ram*, to demolish the wall, and make a breach. This instrument consisted of a great mass of iron, often shaped like a ram's head; attached to a heavy horizontal beam, and either suspended by cords, so as to swing forward with great force, or else mounted on wheels, and running on an inclined platform or railway. Instruments were also used for throwing missiles; (p. 448); and the Roman soldiers often raised their bucklers over their heads, overlapping like shingles, and forming what they called a *tortoise*, for mutual protection when advancing to the assault.

In the middle ages, the baronial castles were fortified, by building them with thick and lofty walls; or with an outer enclosing wall; with flanking towers, and a moat, or ditch, on the exterior. The gate was protected by the *drawbridge*, which could be suddenly raised or removed by those within, to prevent the crossing of the ditch; and by the *portcullis*, which was a heavy grating, made to slide in vertical grooves, or turn on hinges at the top, serving, when closed, as a second gate. The tops of the walls were constructed with *battlements*, or indentations; to enable those above to throw down stones, and other missiles, upon the assailants at the foot; and, in Italy, *machicoulis*, or projecting scaffolds, were constructed, with holes through the flooring, for the same purpose. In the interior of the castle was the *donjon*, or keep; which was made very strong, and served as a citadel, or last resort for the besieged, in case they were driven from the outer walls.

The modern system of fortification, commenced with the enlargement of the flanking towers, until they occupied extensive spaces, and took the name of *bastions*. This change is attributed by some writers to Ziska, the Hussite, at Mount Tabor, in Bohemia, in 1419; and by others, to Achmet Pacha, at Otranto, in 1480: but it seems more probable, that the first regular bastions were constructed by San-Micheli, at Verona, in Italy, in 1525. The *covert-way*, outside of the ditch, was invented by Tartaglia, of Italy, in 1554. *Places of arms*, at the angles of the ditch, on the exterior, were first constructed by Cataneo, about 1574; and enlarged, to form the *demi-lune*, about 1585. Gunpowder was first tried in *mines*, at the castle of Sarezanella, in 1487: but its first successful application was at the castle De l'Œuf, (Naples), in 1503, by Navarre, a Spanish engineer. Errard Bar-le-Duc wrote the first French work on Fortification, in 1594. His system was improved by Pagan; and still farther by Vauban, who corrected the proportions of all its parts. Vauban invented *ricochet firing*, first practised at Maestrict, in 1673, or at Philipsburg, in 1688; and which made an essential change in the modes of attack and defence. The later improvements of Carnot, Cormontaigne, and others, we have no room here to describe.

We proceed to give some farther ideas of Fortification, under the heads of Field Fortification; Permanent Fortification; and the Attack and Defence of Places.

§ 1. *Field Fortifications*, are works thrown up for the immediate use of an army during a campaign; and which, after having served their purpose, are abandoned to decay. The name of *intrenchments*, is often applied to them, from their being usually constructed by digging a trench, or *ditch*, and throwing up the earth on the inner side, to form a *parapet*, or breastwork. (Plate XI., Fig. 1). The sides of the ditch and parapet are made sloping, in order that they may not crumble down so easily. The interior slope of the ditch, is called the *scarp;* and the exterior, the *counterscarp*. The parapet is made 3 feet thick, for defence against musketry; and at least 8 feet thick, to resist cannon; and it has three slopes; the *superior*, inclining gently outwards; the *exterior*, which is made steeper, and separated from the ditch by a narrow step, or *berme;* and the interior slope, or *breast-height*, behind which the men stand, and over which they fire upon the assailants. The crest of the breast-height, is technically called the *covering line:* and when the parapet is high, the men who fire over it, stand upon a *banquette*, or step of earth, which terminates the parapet on the interior. The interior space, immediately behind the parapet, is called the *terre-pleine;* which is sometimes lowered, by excavation: and if there be a large central space, it is called the *parade ground.*

A *rĕdan*, (Pl. XI., Fig. 2), is a triangular work, two sides of which, called faces, are fortified; while the third side, or gorge, towards the rear, is often left open. A small redan, is sometimes called a flèche, or arrow. A *bastion*, (Fig. 3), has a salient angle, and two faces, in front; connected with two shorter lines, called flanks, which are less divergent, and extend to the gorge; this latter being either open, or palisaded, or completely intrenched. A small bastion is also called a lunette. A *bonnet*, mitre, or swallow tail, (Fig. 4), has two salient angles in front, as if it were two redans united, side by side, with a common gorge. These different works are sometimes associated, to form a fortified *line*, or lines; whether separate, but defending each other by their fires; or connected, by intermediate trenches, from gorge to gorge. Any one of these works, completely enclosed, is called a *redoubt;* and a work which is large enough to admit of flanking arrangements, so that one side may enfilade, or fire along the ditch of another side, to defend it, is called a *field fort.* When the work is designed for receiving cannon, it is often called a *battery;* the cannons firing through cross-cuts in the parapet, called *embrasures;* the high parts between which, called merlons, serve to protect the men.

Field works may be farther protected, by *palisades*, or rows of stakes, presenting their sharp points outward, along the scarp, or in the ditch; as also by *wolf-pits*, or holes dug close to each other along the exterior; or by *abattis*, which are fallen trees, placed with their top ends outward, to impede the enemy, while he is exposed to the fire of the work; or by *chevaux-de-frise*, (wooden horses), which are timbers, armed with stakes, projecting in various directions, for the same purpose. Marshes, ponds, deep streams, precipices, and other natural obstacles, are often resorted to, in aid of the defence; the great object of which, is to prevent the access of the enemy. A work on low ground, is said to be *commanded*, when it is overlooked by any other work or ground, so as to be exposed to a fire therefrom. From such heights, the position, if it is an important one, should be *defiladed;* by making the exposed side the highest, so that it may shelter the other side.

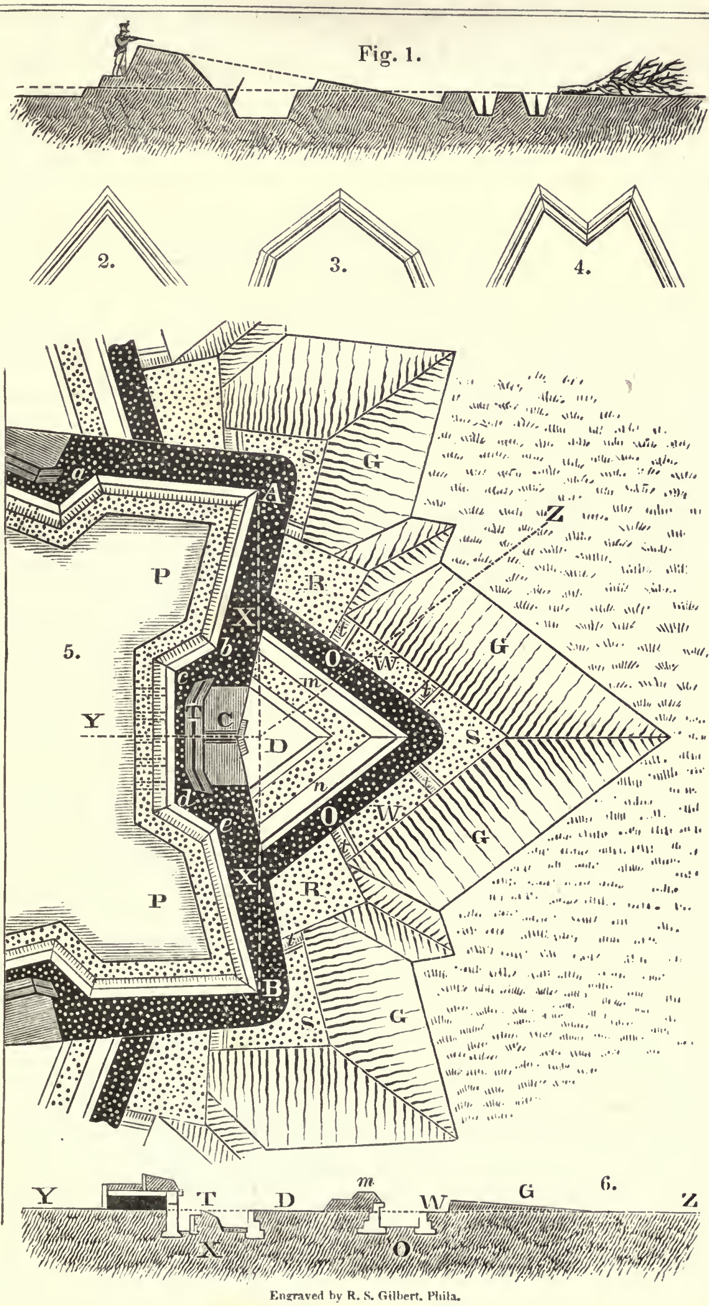
§ 2. *Permanent Fortifications*, or fortresses, are stronger forts, usually built in masonry, around cities, or on the frontiers of countries, and designed for permanent use. The immediate object of a fort, is to separate the defenders, or garrison within it, from the enemy without; whose superior numbers are thus kept in check. This is effected by means of a high wall; on the outside of which is usually a deep ditch; both of them extending quite around the fort; of which they form a principal part. The ditch varies, in different works, from 12 to 20 feet in depth, and from 30 to 100 feet in width; but it should always be too wide to admit of crossing it by ladders or portable bridges. The wall within the ditch, is called the *scarp:* and is usually made about 30 feet high; so that it cannot be easily scaled, if vigilantly guarded. As the scarp is built up from the bottom of the ditch, and screened by the outworks, it is completely protected from the distant fire of the enemy. The exterior wall of the ditch, supporting the earth on the outside, is called the *counterscarp.*

Instead of having a simple circular or polygonal contour, the scarp is broken inward on each side, (Pl. XI. Fig. 5), producing a series of bastions, (*aAbc.* &c.), connected with each other by curtains, (*cd.* &c), so as to form a complete enclosure. Each curtain, with a half bastion on each side of it, forms a *bastioned front;* (*AB*)*;* the parts of which have important relations to each other. The *faces,* (*Ab,* and *Be,*) and the *curtain,* (*cd*) are chiefly intended for firing upon the enemy at a distance: but the *flanks,* (*bc,* and *de,*) are especially intended for the defence of the ditch, in case that the enemy should enter it; as each flank may enfilade the opposite half of the ditch, on that front, with a fire of grape or cannister shot. Thus, each part of the work is protected by some other part, which is not likely to be exposed to an attack at the same time: but, for this object, it is necessary that the distance of any one flank from the salient angle which it is to defend, should not be greater than the effective range of small shot, fired from the flank carronades.

The interior area of the fort is called the *parade;* between which and the ditch, is the *rampart,* of which the scarp forms the exterior face.* The rampart is elevated, in order to overlook the outworks; and to protect the men, or even the buildings, in the interior, from the enemy's fire. The top of the rampart consists of two parts; the *terrepleine,* or interior part, (dotted in Fig. 5), on which the guns are mounted; and the *parapet,* which is the exterior and highest part, to shelter the guns and men on the terrepleine. The parapet has a superior and exterior slope, as in field works; but the breast height is frequently a wall of masonry. Instead of making the whole rampart of solid earth, it is customary, in fortresses, to construct vaults or rooms in it, to protect the men during a siege. *Piers* are built, running back from the scarp wall to the interior of the rampart, which in this case becomes the parade wall; and these piers support *arches,* which are covered with earth; so that the guns stand above them; leaving spacious rooms, called *casemates,* underneath. Some of these casemates are used for guns; which then fire through *embrasures,* or openings, in the scarp wall: some are used for magazines or store rooms; and others, fitted with windows in the scarp and parade walls, with fireplaces and other fixtures, are used as *quarters* for the officers, and *barracks* for the men.

Of the *outworks,* which serve to retard the enemy's approach, the principal is the *demilune,* or ravelin, (Fig. 5. *D*)*;* the faces of which have an advanced and cross fire upon the environs, without being so high as to mask the fires of the main work. The ditch of the demilune, (*O*), is connected with the main ditch; but not quite so deep. Outside of the demilune, is the *covert way,* (*W*), along which guns are mounted, and men stationed, to fire upon the enemy; without intercepting the fire of the mainwork. From the breast

* This is more fully represented in Fig. 6; which represents a section of the fort along the line YDZ, of Fig. 5; as shown by the correspondence of the letters.



Engraved by R. S. Gilbert. Phila.

height of the covert way, the *glacis* (G) slopes off to the natural ground on the exterior. The *salient*, and *reëntering* parts of the covert way, are enlarged, to form *places of arms*, (R, and S), which are separated from the rest of the covert way by *traverses*, (t, t); to ward off the fire of the enemy, and enable these portions to be defended separately. A small work called the *tenaille*, (T), is sometimes placed in the main-ditch, in front of the curtain, to shelter this part from the enemy. The *postern*, or main entrance to the fort, leads through the middle of the curtain: and there is a passage through the tenaille, to the demilune, protected by a *double caponnier*, or kind of glacis, (C), on each side of it, sloping off into the ditch.

§ 3. On the *Attack and Defence of Places*, or the operations during a *siege*, by both the parties concerned, we must here be extremely brief. The besiegers begin by *investing* or surrounding the fort, with a very superior force; protecting themselves from the sorties of the garrison by lines of *circumvallation;* and, if necessary, constructing lines of *countervallation*, to protect themselves from any exterior army coming to relieve the garrison; which latter is thus cut off from all extraneous supplies or assistance. The enemy next advances near to the fort, on what he supposes to be its weakest side; and there, under cover of the night, digs a trench, to shelter his men, called the *first parallel.* This trench is often more than a mile long; and extends circularly around that side of the fort, at a distance of 600 or 800 yards. A strong guard is then placed in it, to defend the *sappers;* who now dig trenches from it, advancing towards the fort, called *boyaux.* These trenches proceed obliquely, in a zigzag line towards the fort, to avoid being enfiladed by its fires.

Meanwhile, the besiegers are erecting *batteries*, at intervals along the first parallel, to destroy or silence the guns of the fort, before they venture to approach nearer. The *ricochet* fires, in which the ball strikes so obliquely, as to rebound several times successively, are the most effective for this purpose. When the boyaux are extended nearly halfway from the first parallel to the fort, a *second parallel* is dug, to which the guards are then advanced, while the sappers advance still farther. In this manner, the third or fourth parallel will bring them close to the crest of the glacis; along which they will next, by sapping, or by storm, dig a trench, in which to defend themselves, and erect new batteries to make breaches in the walls of the fort. The digging of this trench, is called *crowning* the covert way; from which, the garrison will then be obliged to retreat to the demilune. As soon as a breach is made in the scarp of the demilune, and a gallery dug by which to descend into its ditch, the besiegers will storm this outwork, climbing up over the ruins, and entrenching themselves therein; and they will then proceed in the same manner to carry the mainwork, unless it capitulate, or be relieved by an external force.

The providing of means for passing armies over rivers, is a common duty of the engineers and artillery. Where ordinary bridges are not, or cannot be constructed, and common boats cannot be procured, *pontoons* are occasionally used; which are flat bottomed boats of a prescribed shape and size; such as are usually transported, in considerable numbers, in the train of European armies. The boats, or pontoons, used for a bridge, are anchored or moored at short intervals from each other, with their heads pointing up the stream; after which scantling is laid across them, with proper lashings; and the whole is then covered with suitable planks. Of the construction of military roads; the laying out and fortifying of camps; and the making of military reconnaisances; we have no farther room here to speak.

CHAPTER III.

GEOTACTICS.

We propose the term Geotactics, to include the exercises of troops of all kinds; by which they are enabled to act in concert, in the discharge of their proper functions. The name is from the Greek, τασσω, or τατγω, I arrange; and it is sometimes made to include Strategy or Grand Tactics; that is, the management of battles and campaigns: but the later writers have justly considered this a distinct and higher branch of Machetechnics. We have added the prefix *Geo*, from γη, the earth, to distinguish this from Navitactics, or Naval Tactics; a kindred, but separate branch. Geotactics comprises three principal divisions; *Infantry Tactics*, relating to troops which use the musket or rifle; *Artillery Tactics*, relating to those whose chief weapon is the cannon; and *Cavalry Tactics*, for troops which fight on horseback, with the sword and pistol. The process of instructing troops in their respective exercises, is called *drilling;* on which their efficiency essentially depends.

The arts of Tactics were carefully studied by the Greeks and Romans; and greatly contributed to their military successes. The Grecian infantry were grouped in *lochoi*, or bands; *taxes*, or companies; *xenagiæ*, or battalions; and *chiliarchiæ*, or regiments; all having their proper officers. Their cavalry were subdivided into *ilai*, or squadrons; and *hipparchies*, or regiments; usually of 8 squadrons, or 512 horsemen each. The Grecian *phalanx*, was drawn up in a rectangular form having from 8 to 16, or even 32 ranks; with a front usually of 500 men: its force having gradually increased from 4,000 to 16,000 infantry. The Roman *century*, was so called because it originally consisted of 100 men; though the number was afterwards increased. Two centuries constituted a *maniple;* three maniples, a *cohort;* and ten cohorts composed a *legion;* two of which, commanded by a consul, formed a consular army. The Roman legion was gradually increased, from 3000 to 6000 infantry, besides 300 cavalry; which last were drawn up in ten *turmæ*, or troops. On the distribution of the different classes of soldiers, in the legion and phalanx, more will be said in treating of Strategy.

The modern changes in the weapons of war, introduced corresponding changes in the organization of troops; of which the three principal kinds are variously subdivided. The *heavy infantry*, or infantry of the line, including grenadiers, armed with muskets and bayonets, compose the great mass of modern armies. The *light infantry*, including riflemen, armed with lighter guns, or rifles, are chiefly employed as skirmishers, or advanced guards, or for rapid marches and sudden attacks. The *heavy artillery*, are foot soldiers, armed with short muskets, and swords; their cannon, and caissons or ammunition waggons, being drawn by horses. The *light artillery*, or at least the flying artillery, are all mounted, and armed with pistols and broadswords; with light guns, drawn by strong horses. The *heavy cavalry*, are properly cuirassiers, armed with a helmet and cuirass, and broadsword and pistols: other cavalry are carabiniers, armed with carabines, and straight swords; and among the *light cavalry*, are hussars, of Hungarian origin, armed with sabres; and lancers, such as the Russian Cossacks. *Dragoons*, are armed with muskets, and fight either on horseback or on foot: and *voltigeurs*, are troops that ride behind cavalry to the scene of action; then alight and fight on foot.

We proceed to notice separately the three divisions of Geotactics, Infantry, Artillery, and Cavalry Tactics, already referred to.

§ 1. *Infantry Tactics*, is the most important division of this branch; as it embraces, to a considerable extent, the principles of the other divisions. Infantry are usually drawn up in *companies*, of 50 or more men each; and eight or ten companies usually constitute a *regiment*. In manœuvring, each regiment is termed a *battalion;* though this name is often applied to a half regiment. Two regiments form a *brigade*, commanded by a brigadier general; and two brigades form a *division*, which is a major general's command. The officers of a regiment, in the order of rank, are the *colonel*, lieutenant colonel, and major; of whom, the highest who is present takes the command. The regiment is paraded, and orders are announced, by the *adjutant*, assisted by the serjeant major. The name regiment was first introduced into the French service, in 1567: and the title of colonel was first applied in its present sense, in 1661.

The commissioned officers of a company, in the order of rank, are the *captain*, lieutenant, and ensign; and the subalterns are the sergeants, and corporals, usually appointed by the colonel. The first sergeant, is called the *orderly sergeant;* who forms the company, and commands it, in the absence of the commissioned officers. A company is usually drawn up in two *ranks*, the front, and rear. A man in the front rank, called a file leader, and one directly behind him, called his file-closer, together constitute a *file* of men. A company is divided into two platoons; and a platoon into two *sections;* each consisting of two ranks, with as many files as there are men in the front rank. One sergeant, and one corporal are assigned to each section; but their posts or positions we have no room to specify. When in line, the captain is stationed on the right of the company; but, in column, his post is in front. Two companies united constitute a grand division; of which there are usually four in a regiment.

The *School of the Soldier*, includes such instruction as every soldier must receive, preparatory to entering a company or battalion. The recruits, drilled in small squads, are first taught the position of a soldier, which should be erect and firm; next the dressing or aligning of themselves towards the right or left, according as the command is *right* DRESS, or *left* DRESS; and next, the facing, or turning to the right or left, always on the left heel as a pivot, at the command *right*, or *left* FACE. They are next taught to march; always commencing with the left foot, and taking steps of 28 inches in length; 90 in a minute for common time, and 120 for quick time, being the standard speed. Troops marching in line, those of the same rank being side by side, change direction, either by *wheeling*, or *turning:* but when marching by a flank, or those of the same rank following or covering each other, they then change direction by *firing*, to the right, or left.

The remaining part of the School of the Soldier, relates to the use of arms, or the *manual exercise*, with the musket and the rifle; but we here refer exclusively to the former. At the command *shoulder* ARMS, the musket is made to rest vertically against the left shoulder, supported by the left hand placed under the butt; the lock being turned to the front. To *order* ARMS, when shouldered, the right hand is made to seize the gun, above the lock, and bring it down to the right side; the butt resting on the ground, the lock turned to the rear, and the barrel resting against the right thumb and fore finger. To *load in twelve times*, the successive commands are, 1. LOAD; 2. Open-*pan;* 3. Handle-*cartridge;* 4. Tear-*cartridge;* 5. *Prime;* 6. Shut-*pan;* 7. Cast-*about;* 8. Charge-*cartridge;* 9. Draw-*rammer;* 10. Ram-*cartridge;* 11. Return-*rammer;* 12. Shoulder-*arms*. At the first command, the gun is brought to a horizontal position at the right side, pointing to the front, and supported by the left hand: and, at the seventh command, the gun is carried around to the left side, with the butt resting on the ground; and the remainder of the cartridge, hitherto held in the right hand, is afterwards inserted in the gun, with the torn end downwards; the paper of the cartridge serving as a wad, both for the powder and ball. To *load in four times*, and to *load at will*, are performed in the same manner; but with four commands, in the former case, and only one in the latter.

The *School of the Company*, includes instruction in all manœuvres which are performed by a company; either alone, or considered as a part of a battalion. It consists of the different exercises, in marching and fighting; as taught in the school of the soldier, but here repeated by the whole company. On parade, the manual exercise is performed with *open ranks;* the rear rank taking six steps backward, to make room between it and the front. When firing, in close order, the men of the rear rank aim over the right shoulders of their file leaders respectively. When marching in line, if the sergeant, acting as guide, is on the right of the line, the men touch and dress to the right; but if on the left, then the left regulates the movement. When, from marching by a flank, the company is to come into line, the rear files advance rapidly, and take their places on the right or left of the leading file; the file leader of which, retains his position. The platoons, or sections, when marching in column, keep at wheeling distance from each other; so that by halting, and wheeling to the right or left, they would again be in line. Of the

School of the Battalion, or evolutions performed by a single regiment; and of *Evolutions of the Line*, as performed by several regiments; we have no room here to speak. The exercises of Light Artillery, and Riflemen, are closely assimilated to those of infantry of the line.

§ 2. *Artillery Tactics*, includes the various manœuvres and exercises required in marching and fighting with cannon. There are four principal kinds of cannon, used in modern warfare; the *gun*, including the light field piece, and the heavy garrison piece, with others of intermediate size; the *carronade*, which is shorter and thicker, and of less certain aim, but still very useful in forts and on shipboard; the *howitzer*, which is also short, thick and strong, but used for firing shells horizontally; and, lastly, the *mortar*, which is extremely short, having a bore of not more than two calibres in length, and used for throwing bombs or shells to a great elevation. The *Paixhan gun*, which has recently attracted much notice, is essentially a howitzer, of great weight and strength, and designed for throwing shells of very large size. Of the weight of cannon, and the nomenclature of their parts, we have already spoken, as far as our room would permit, in treating of Ordnance. (p. 489).

Field Artillery, is generally organized in *batteries*, of six pieces each; four guns, and two howitzers. Allowing eight men to each gun, such a battery requires a *company* of 48 men, besides officers, drivers, and a small reserve. Eight, or ten such companies, form a *regiment* of artillery; and a half regiment is sometimes called a *battalion*. The officers of artillery, have mostly the same titles and functions as those of the infantry; with the duties of which they ought also to be acquainted. When horses are used, as they generally should be, for drawing the guns, they are harnessed to the *limbers;* (p. 490): and when the gun is unlimbered, it may still be dragged by the horses, by using a long rope, called a *prolonge*, to connect the gun with the limber. When the men themselves draw the gun, they do it either by draught ropes, or, when in action, by means of *bricoles;* which are leather straps passing over the shoulder, with a cord and hook to each, for fastening to the carriage.

The *Manual of the Piece*, is performed by two *gunners*, and four *cannoneers*, or matrosses, who are numbered, in order to designate their position. The piece being unlimbered, with the trail resting on the ground, and the muzzle turned to the front, it is then said to be *in battery*. The men then take posts on each side of the piece, facing towards it, as follows: No. 1., with the sponge and rammer, on the right of the muzzle; No. 2., on its left: No. 3., with portfire and linstock, opposite the cascable, or rear of the piece, on the right; No. 4., with a havresack, for ammunition, opposite to the cascable, on the left; the Gunner of the right, opposite to the middle of the pointing or trail handspike, on the right; and the Gunner of the left, with finger stall, tube pouch, priming tubes, and priming wire, opposite to the pointing handspike, on the left. At the command "*to action*," the gunner of the right steps to the pointing handspike, gives the order to "*load*," and assists the gunner of the left in pointing the piece. Nos. 1. and 2. step within the wheels, and sponge and load the piece; but, while drawing out the moist sponge, it is of vital importance that the gunner of the left should close the vent with the finger, protected by the stall, or leather covering; in order that any fire, previously remaining in the gun, may be extinguished, by the transient exhaustion of the air. The gunner of the left, having aimed the piece, pricks the cartridge, and inserts a priming tube in the vent; when No. 3., having lighted his portfire, touches off the gun, at the command to that effect.*

The *School of the Battery*, comprehends the manœuvres of several pieces in concert; usually six pieces, manned by an artillery company. Such a battery is subdivided into three sections, of two pieces each; and sometimes into two half batteries. When the horses' heads are directed to the front of the line, and the pieces point to the rear, the battery is said to be *in line:* but when the reverse is the case, the battery is said to be *in battery*. In both cases, the caissons are in rear of the guns; which are placed at such a distance apart that the sections may wheel to the right or left, and occupy no greater space in column than in line. It will be seen that in order to advance, from the position in battery, the horses must first turn, with the pieces, and face to the front; and that, in order to resume a position in battery, they must turn again, and face to the rear. To form a column of sections, fronting to the right, the command is, "*by section, right wheel;* MARCH;" when the first section of the battery in line, by wheeling to the right, becomes the head of the column; and the other sections cover it, in its rear. Of various other evolutions, depending on similar principles; and of the manœuvres of horse artillery; as well as the exercise of mortars and garrison pieces; and the art of gunnery; our limits forbid any farther notice.

§ 3. *Cavalry Tactics*, includes the exercises and evolutions of mounted troops, other than horse artillery, in marching and fighting, on horseback. It embraces, of course, many exercises in common with those of the mounted artillery: as the *manége*, or management of horses and art of riding, and the general principles of formation. Cavalry is usually drawn up in *companies*, or troops, of from 50 to 100 men each; two of which form a *squadron*, corresponding to a grand division of infantry; and eight of which usually form a *regiment*. The grades and titles of cavalry officers, for the most part, correspond to those of the officers of artillery and infantry. A troop of cavalry is usually paraded in two ranks, the front and rear; with intervals of six inches between the men in the same rank; and a distance of three feet between the ranks, in *close order*, and twelve feet, in *parade order;* but in *open order*, the rear rank is distant a half squadron's length from the front rank, so that on wheeling by troops, to the right or left, these ranks would form one continuous line.

A man in the front rank, and the man who covers him in the rear rank, together constitute a *file;* and when the line forms a column, by *filing* to the right or left, and taking distance, the two men of the same file are abreast of each other: but the column, in this case,

* The seventh and eighth men, or Nos. 5 and 6, are stationed opposite to the limber: but, in action, their duty is to supply the piece with ammunition, from its caisson, or ammunition waggon, in the rear.

is much longer than the line, which it previously formed. When the troop is all formed continuously in one rank, it is said to form *rank-entire:* but when the men of each rank are divided into triads, or divisions of three each, they are said to form *ranks by threes;* the advantage of which is, that three men occupy as much breadth as depth, and can wheel as one body, on their own ground; the centre man being the pivot. A troop thus arranged, would present, after wheeling, a column of six men abreast, three of the front rank and three of the rear; who by wheeling back again by threes, would resume their places in line. To these explanations, we can only add, that the evolutions of cavalry are quite analogous to those of infantry and artillery; and that the words of command in these three arms should be made to correspond as nearly as possible. (p. 513.)

It remains to speak briefly of the *Sword Exercise;* which is of the greatest importance to cavalry, in making a charge. At the command, *draw*-SWORD, this weapon is seized by the hilt, drawn from the scabbard, and extended to the front, with the point a little raised, and the edge towards the right; it is then brought to a vertical position, the edge to the left, and the sword hand raised, with the thumb under the chin; and finally carried forward, by extending the arm, holding it still vertical, and the edge turned towards the horse's left ear. To *slope*-SWORD, the hand is then raised a little, and the back of the sword rested on the right shoulder: and to *carry*-SWORD, is to bring it again to the last position of drawing. In the motion to *guard*, the sword is first raised vertically, bringing the hand to the left breast; then extended forward, and held nearly horizontal, pointing a little to the left, with the edge turned to the right, and inclined slightly downwards. In the *St. George*, or *head protect*, the sword is held above the head, pointing over the left shoulder. The *six cuts*, are different strokes of the sword; *cut one*, downwards to the left; *cut two*, downwards to the right; *cut three*, upwards to the left; *cut four*, upwards to the right; *cut five*, horizontally to the left; and *cut six*, horizontally to the right. The pistol exercise, we have no farther room to notice.

CHAPTER IV.

STRATEGY.

STRATEGY, or Grand Tactics, is that branch of the Arts of War which relates to the more extended operations of armies during a compaign; or, in other words, to the duties of a general commanding in chief. The name is derived from the Greek, στρατος, an army; and αγω, I lead; or from στρατηγια, of corresponding signification. It is a branch of high importance; to which the three preceding branches are entirely subordinate: and it should, therefore, be studied not only by high commanders, but by those who aspire to high command. Geotactics relates to the training of individual corps, or their component parts; but *Strategy*, or Grand Tactics, relates to the combining of different corps, to form an army, and the means or modes of employing them so as to produce the greatest result. The principles of Strategy, are derived partly from reasoning on the effects of certain measures; but chiefly from experience as to the effect of these and similar measures, in cases where they have actually been tried.

Strategy is an art of ancient origin, though it has but recently been treated as a branch distinct from Tactics. It was practised by Alexander and Cæsar; and in the arrangement of the Grecian phalanx, and the Roman legion, as well as in the marshalling of modern armies. (p. 498.) In the Grecian phalanx, the *hoplitai*, or heavy armed infantry, clad in full armor, with broad shields, straight swords, and long spears, appear to have occupied the rear; while the *peltastai*, or targeteers, with smaller shields and spears, held the middle place; and the *psiloi*, or light troops, armed with darts, arrows, and slings, were posted in front, to begin the action. The *hippeis*, or cavalry, either protected the flanks, or formed a reserve. The Roman legion was, in early times, drawn up in three ranks; the *hastati*, or young men, in front; the *principes*, or middle aged next; and the *triarii*, or veterans, in the rear. They were all armed with a shield, sword, spear, and two javelins; but the hastati bore the largest shields, and the triarii, the longest swords and spears. The *velites*, or light troops, had no particular place assigned them, but fought as skirmishers, with javelins, slings, and stones, or bows, and arrows. Of ancient marches, encampments, and battles, we have no room here to speak.

The great elements of Strategy, or the combining of strength with rapidity of motion, were first developed by Maurice of Nassau; practised and extended by the Duke of Marlborough; farther improved by Frederick the Great; and finally perfected by Napoleon; who taught them, at last, even to his enemies. The works of Lloyd and Tempelhoff, describing the military operations of Frederick the Great, are perhaps the earliest modern writings in which these elements are formally stated and explained. Bülow, in his work on the Theory of War, appears to have committed some grave errors; such as in maintaining that retreats should be made in separate corps, diverging from each other. Jomini opposes this and other maxims of his; and insists that the forces should be kept concentrated, and led by the shortest way, to attack the enemy in overwhelming masses: in proof of which he cites many of the most brilliant exploits of Napoleon; and might have cited those of his last successful antagonist, the Duke of Wellington. In our own country, the most instructive lessons may be drawn from the prudent measures of Washington, compared with those which proved fatal to Burgoyne and Cornwallis; while they show that a war of self-defence has greatly the advantage over one of invasion or conquest.

Our further remarks on Strategy, will be arranged under the heads of Preliminary Operations; Marches and Encampments; and Battles and Retreats.

§ 1. Among the *Preliminary Operations* of a campaign, or season's warfare, are the organization of an army or armies, and the devising of plans of operation. European armies often comprise many *corps;* each corps consisting of one or more divisions; each division, of two or more brigades; and each brigade, of two or more regiments or battalions. In smaller armies, a single brigade, or even a battalion, may be considered as forming a distinct corps. The principal *arms*, so called, which compose the strength of an army, are the infantry, artillery, cavalry, and engineering or fortification. As cavalry and artillery are far more expensive than infantry, the latter constitute the great mass of modern armies. Thus, the whole French army, in 1804, consisted of about 500,000 infantry; 20,000 artillery; 70,000 cavalry; and 10,000 engineers, including sappers and miners. The regular army, authorized to be raised by our government, in the war of 1812, would have amounted to 62,448 men; but the number in service at any one time was far less. The present army of the United States, consists of eight regiments of infantry, four of artillery, and two of dragoons; which, with the staff corps, form a nominal aggregate of 12,539 men.

Troops are raised or recruited, either by voluntary enlistment, or by draughts, or conscriptions, under the direction of the civil government. Although the militia are the great resource for the defence of a nation, still they cannot generally be depended upon, until they have been drilled and practised in warfare, so as to acquire somewhat of the character of regular troops. The importance of drilling a sufficient body of our militia, to be ready to suppress insurrection, or repel invasion, seems to be too evident, and urgent, to require an argument here in its favor. The means of providing supplies of every kind for an army, have already been indicated, as far as our limits would allow, in treating of Hoplistics. (p. 490 and 492). The *Staff Corps and Departments* of our own service, are 1. The Adjutant General's department; 2. The Inspector General's department; 3. The corps of Engineers; 4. The corps of Topographical Engineers; 5. The Ordnance department; 6. The Quartermaster department; 7. The Subsistence department: 8. The Purchasing department; 9. The Medical department; and 10. The Pay department. The chief officers of these different corps and departments, present with the army, together with the chaplains and the aides-de-camp (or aidecamps) of the commander, constitute the *Staff* of the army; on which its efficiency greatly depends. The *Adjutant General*, keeps all records relating to the *personnel* of the army, or the officers and men; and issues the orders and regulations directed by the Commander-in-chief. The duties of the *Inspector General*, are implied by his title; and can here require no farther mention.

Before taking the field, it is customary for the commander to digest a *plan of operations*, proposing the accomplishment of certain objects, and based on the best information which he can obtain; but liable to alteration from the various and uncertain chances of war. As such a plan generally has reference to a whole season, it is also called a *plan of the campaign*. It depends upon a knowledge of his own strength, and that of the enemy; and a knowledge of the country which is to be the field or theatre of war. If the objects of the campaign be purely defensive, as the protection of a certain region, or frontier, or fortress, or chain of fortresses, with supplies in the vicinity, the plan is then limited to the best arrangement of the troops for this object; recollecting that they should not be so much subdivided, nor so far separated, as to expose them to defeat in detail; and that the best defence may sometimes be made by carrying the war into the enemy's own country, or meeting him in advance.

But if the objects proposed be offensive, the plan of operations becomes much more complicated. Considering the whole field or theatre of war as one great parade ground, the side towards the enemy is called its *front;* the opposite side, its *rear;* and the other sides are called the right and left *flanks.* If the army draws its supplies and recruits from the rear, the space where they are assembled, or whence they are procured, is called the *basis of operations.* As the army advances, the roads or routes by which these supplies are carried forward to overtake it, are called *lines of operation.* As these lines usually require to be guarded by detachments, stationed at successive posts along them; and as the army, if obliged to retreat, ought generally to be concentrated at some one position; it is generally preferable to have only one *principal line* of operations, which may then be guarded more strongly. The posts, for this purpose, should of course be carefully selected; and, if possible, fortified, at least with field works.

§ 2. *Marches,* are generally performed in column, on account of the narrowness of roads; and, if long, they require nightly *Encampments,* to give rest to the troops. The column of march, should be so disposed that it may readily deploy, or display in line, by oblique marches of its centre and rear to the right and left, if it should be necessary to give or sustain battle. It should be protected by strong *van* and *rear guards;* with scouts and skirmishers on the flanks, and in all the environs; to guard against surprise, and gain useful information. The greatest precautions are required, in passing forests, ravines, bridges, or other *defiles;* where an enemy might lie in ambush, and where there would be no room to form in battle array. The *baggage train,* should be placed either in the column, or so near it that it may be speedily defended, in case of an attack; being of course well guarded. *Detachments* are often required, as guards, or escorts, or foragers: and they should neither be so weak as to be easily overpowered, nor yet so strong as greatly to weaken the main army.

The crossing of rivers, in presence of an enemy, and especially in retreating, is one of the most hazardous warlike operations. To the means of constructing bridges for this purpose, where bridges are wanting, we have already briefly referred. (p. 497.) If they are to be built in the face of an enemy on the opposite shore, he must be driven back by a powerful cannonade; by which the troops that are to cross should also be protected. If we are to retreat across a river, with the enemy pursuing, it is very desirable to have defensive works near the entrance to the bridge; forming a *tête-de-pont,* by which the enemy may be held in check, and within which our troops may be sheltered, till all have crossed except the rear guard; which then evacuates the works, and destroys the bridge, the moment that it has crossed it. It is only by keeping the enemy at a distance, while the successive corps are crossing and *debouching* on the opposite shore, that such a movement can be effected without certain destruction.

In all marches and movements, it is important that our different columns, or corps, should keep within *striking distance* of each other; so that if either were attacked, the others might come in time to aid it. The nearer the enemy may be, the more concentrated should our own troops be, to effect this object. It is not safe to divide our own army, because that of the enemy is divided, unless one of our corps can be trusted to itself, while the other is able to vanquish one of the opposing corps. A better course, in this case, is to attack one of the enemy's corps with our whole force; and thus beat him in detail. If our supplies come from the rear, it is of the greatest importance to preserve our line of operations, and prevent the enemy from intercepting our convoys. The line of battle, of an army, which is usually perpendicular to its line of operations, is technically called a *parallel;* because it is also parallel to the enemy's line. Should the enemy move to the right or left, in his parallel, it may require a corresponding movement of our own, either to give or avoid battle; and this may require a change in our line and plan of operations, unless it has been already provided for.

§ 3. A *Battle*, is properly an engagement in which the great mass of both the contending armies is present; and if unsuccessful, it generally necessitates a *Retreat*, or if this be impossible, a surrender. When a part only of one or both armies, is present, the engagement is called an *action*, or *affair;* and if it is between only a few troops, and attended with slight results, it is called a *skirmish*. Of course a battle should be voluntarily hazarded only under favorable circumstances, or else for some urgent reason: and the army which acts on the offensive, is the most likely to win the day, because troops on the advance generally retain their courage and firmness better than those who await the onset. An army, anticipating an attack, should choose a strong and somewhat elevated position; with natural obstacles, or temporary works, if possible, to defend its flanks; but with a free passage for retreat, in case of heavy reverses. It is also desirable to have some detached field works in front, to break the shock of the enemy's charge; but with intervals through which charges may be made in return. Besides the main army, usually drawn up in two lines, there should be a strong *reserve*, ready to act at any critical moment.

If any positions can be found, from which the enemy's line can be enfiladed by our artillery, they should of course be made available. Instead of distributing the different troops uniformly along the line, it is generally better that the cavalry, and artillery, should be concentrated in large masses; which can thus be made to act more effectively against the enemy. An attack is often made on one wing or flank of our line; which method is called an *oblique attack*, or oblique order of battle. The best mode of meeting it would probably be to make the threatened wing change front, and stand its ground, while the main army takes such a position as to outflank the enemy, instead of allowing itself to be outflanked: but a skilful general would always endeavor to avoid being exposed to an oblique, or a flank attack. An army throwing back one wing, so as to present a salient angle in its line, is said to form a *potence*, or crotchet; but such a position can rarely be recommended. Oblique movements, are often advantageously made by *echelons*, of battalions, or brigades, preserving certain intervals, by which they are left more free to manœuvre, or engage, or retreat. To attack the weakest point of an enemy, with an overwhelming force, and then follow up the success, appears to be the leading maxim of Strategy; applicable by sea as well as by land.

CHAPTER V.

NAVITACTICS.

Navitactics, or Naval Tactics, is that branch of Machetechnics which relates to the arming, manœuvring, and fighting of ships of war. The name is derived from the Greek, ναυς, (or the Latin *navis*), a ship; and τασσω, I arrange. This great division of the arts of war, depends immediately on the branches of Navitecture and Navigation; which have already found their place in the present classification of knowledge, and to which we here simply refer. (p. 451). *Ships of War*, are distinguished from merchant vessels, by their being generally larger, stronger, and armed with numerous guns; while the latter seldom carry more than one or two, for making signals. They are also recognized by some peculiarities of rigging; which are at once detected by a practised eye; but which cannot here be described. A *navy*, is the whole assemblage of vessels of war belonging to one nation; any number of which, serving together, under one commander, is called a *fleet*, or, if small, a *squadron*. On the importance of navies to the defence of maritime nations, now so generally admitted, we need not here enlarge.

The earliest instance of naval warfare, is assigned by some writers to Erythras, who, at an early period, became master of the Red Sea; but by others to Neptune, or to Jason. The ancient ships of war, called *galleys*, were usually of moderate size; and, though provided with masts and sails, they were generally manœuvred, in battle, by oars alone. Some of them had two, and some of them three rows or *banks of oars*, one above the other; those above being the longest, and pulled by men sitting or standing on higher benches. Those with three banks, were called by the Romans, *triremes*. The *beak*, or foremost end, of the galleys, was made very strong: often presenting the shape of a lion, or some formidable figure: and an attack was sometimes made by rowing with all force, and striking, with the beak, the side of the opposing vessel, with a view to crush and sink it, or *run it down*. The largest of the Grecian vessels at the great battle of Salamis, had 50 oars, but only 18 fighting men.

The *rowers*, were deemed of inferior grade to the *soldiers;* who fought with javelins and arrows, or manned the heavy weapons.

These consisted of *balistæ*, for hurling stones heavy enough to pierce the bottom of the opposing ship, and sink it, as they fell; *dolphins*, or battering rams, of iron, suspended from the mast, and made to swing, with heavy blows, against the sides of the enemy; or *crows*, which were long beams with iron hooks at the prows, first used by the Roman consul Duillius, to grapple with the Carthaginian fleet; by means of which the Romans were at once enabled to board their enemy. Ignited combustibles were sometimes thrown upon the foe, to burn his vessels; and the Greek fire, invented at a late period, served this purpose most effectually, as it could not be extinguished. The ancient mode of drawing up a fleet, was in the form of a triangle: the admiral's ship being in front; the others extending from his, in two diverging lines; and the store ships forming a connecting line in the rear.

With the general introduction of fire arms, and improvement of navigation and ship-building, naval warfare assumed a new aspect. Ships of war were built so large that oars became insufficient to move them; and they were propelled by means of sails alone. *Port holes*, were invented by Decharges, a French navitect at Brest, in 1500; and the *Great Harry*, of 1000 tons burthen, built in 1509, under Henry VII., was the first British ship of war which carried guns on two decks. In the reign of James I., ten ships were built, of 1400 tons burthen, and 64 guns each; but they were still inferior in size to the ships of the Spanish and Portuguese. The earlier ships of war were greatly encumbered by lofty forecastles and quarterdecks, forming as it were, towers at the ends of the ship, but greatly impeding her sailing, increasing her exposure, and diminishing her force. The use of *naval signals*, is said to have been improved and extended by the Duke of York; but it is only within the last century that the evolutions of fleets have been reduced to anything like system. The invention of the mode of attack by breaking the enemy's line, is claimed by Mr. Clerk; who wrote on this subject in 1779: but its originality has been strongly disputed by Sir Howard Douglass.

Our own country may claim to have made some decided improvements, both in naval architecture, and naval tactics; as the results of former wars abundantly testify. The introduction of Paixhan guns, throwing shells of great weight horizontally, is likely to render naval warfare more hazardous, and its results more decisive than they have hitherto been deemed. This we regard as a happy omen: for the more dangerous war becomes, the less disposed will nations be to engage in it. The use of steam, for propelling large vessels, is also likely to make some change in naval warfare; though it will not probably turn the balance of power, unless it be against those who neglect it. The idea has been entertained by some persons, that the use of steam batteries, for harbor defence, will supersede the necessity of fortifications on shore. This opinion we cannot adopt: but considering the great advantage which forts possess over floating batteries, in regard to safety, certainty of aim, and permanency, where they are well planned and constructed, we think they must continue to be regarded as an essential element of coast and harbor defence.

We proceed to give some farther ideas of Navitactics, under the heads of Naval Armaments; Naval Engagements; and Manœuvres of Fleets.

§ 1. A *Naval Armament*, consists of vessels of war, fully armed, manned, and equipped for active service: but the term *armament*, is also applied to the guns of a single vessel. Vessels of war are ranked according to the number of decks on which their guns are carried. Those carrying guns on three or more decks, are called *ships of the line*, or line of battle ships; carrying usually 74, but some of them 100, or even 120 guns. Those carrying guns on two decks, are called *frigates;* if of 44 guns or more, frigates of the first class; but if of smaller armament, frigates of the second class. Vessels carrying guns on one deck only, but ship-rigged, are called sloops of war, or *corvettes;* and carry usually 18, 20, or 24 guns. Other vessels, chiefly of still inferior force, receive their appellation merely from their *rig* and *build*, as brigs, schooners, and cutters. Among the principal officers of a vessel of war, are the captain, lieutenants, midshipmen, sailing master, quarter masters, boatswain, carpenter, and sailmaker; besides the chaplain, surgeon, purser, and captain's clerk.

The uppermost deck of all vessels of war, is called the *spar-deck*. When there is another deck carrying guns, it is called the *gun-deck;* and if there are two others, they are distinguished as the upper and lower gun-decks. Next below the gun-decks is the *orlop-deck*, or orlop; and below this are the *hold*, for stowing spare rigging and provisions; and the *magazine*, for storing powder,—which lies entirely below the surface or level of the water. Ships recently built, have an arrangement for *drowning* the magazine; or filling it with water from below, to prevent the powder from exploding, but without admitting the water into the rest of the vessel. The guns, usually 42, 32, 24, and 18 pounders, long guns and carronades, are mounted on carriages resembling those for garrison guns, running on trucks or small wheels; and their recoil is limited by a strong rope attached to the side of the ship. The officers are quartered aft, and the men forward, on the gun-decks; the upper one in preference.

The dimensions of ships of war have been materially increased, in recent times. A ship of 120 guns is about 210 feet long on the lower gun deck, and has a breadth of beam of about 58 feet, and a depth in hold of about 33 feet; the extreme length being about 230 feet, and the burthen about 3200 tons. A ship of 74 guns, is about 196 feet long, and 54 broad, and of about 2600 tons burthen. A frigate of 44 guns, is about 179 feet long, 47 broad, and of about 1600 tons burthen; but a sloop of war, of 24 guns, is about 132 feet long, 36 broad, and has a burthen of about 900 tons. A ship of the line, draws at least 24 feet of water; a frigate of 44 guns, 22 feet; and a sloop of 24 guns, draws 16 feet of water. A ship of 120 guns, requires a crew of about 900 sailors and gunners, besides marines; a 74 gun ship, requires 650; a 44 gun frigate, about 300; and an 18 gun sloop of war, requires about 125 men, besides *marines;* these latter being soldiers, designed to act as a guard, and to assist in close combat, especially in boarding. The usual complement of marines in the British service, is one for every gun. The rigging of ships of war, differs so little from that of the largest merchant ships, as to require no farther notice in this place. (p. 453.)

§ 2. *Naval Engagements*, or battles, may take place either between fleets, or single ships: but the mode of fighting being essentially the same in both cases, we shall confine the present description to those of the latter kind. When two hostile ships come in sight of each other upon the ocean, the one which happens to be to the *windward*, or on the side from which the wind blows, is said to have the *weather gage*. This is considered so great an advantage that ships often manœuvre some time before fighting, the one to gain, and the other to retain it. If the weather, or windward ship, be of inferior force, it enables her to avoid an action much longer; and, in the opposite case, she can the more speedily bear down upon her enemy. Moreover, the windward ship is less endangered in action; as she careens towards the enemy, and exposes less of her side to his fire. A ship sailing with the wind on her right, is said to be on her *starboard tack;* but with the wind from the left hand, she is said to be on her *larboard* or left hand tack.

In preparing for action, the courses, or lower sails, are usually hauled up, and not used; though kept in readiness, if required: the ship being most manageable under topsails, top-gallant-sails, gib, and spanker. The crew are called to quarters by beat of drum; each man taking the station which had previously been assigned to him in *drilling*. The *commander*, is stationed in the hinder part of the ship, called the quarter deck; and his orders are communicated to the *lieutenants*, or other commanders of sections, or batteries, as also to the *sailing-master*, and other officers, either directly, or by sending his aids,—who are usually *midshipmen*, selected for this purpose. The carpenter rigs the pumps; collects his plugs to stop shot holes; and has fishes or splits of wood ready for strengthening a crippled mast or spar. The surgeon is stationed in the *cockpit*, a part of the hold prepared for the purpose, to attend to the wounded. The decks are wetted and sanded, the latter to prevent their being slippery; and vessels of water are provided to extinguish fire. Finally, the magazine is opened by the gunner and his crew; and the ammunition served to the powder boys, who pass it to the different guns.*

Meanwhile, the ship nears the enemy; and as they sail past, or alongside of each other, the firing commences in close action, if it did not begin at a distance. Each ship, in firing, except with bow and stern chasers, (long guns), must present its side to the enemy; and then usually fires a *broad-side*, or nearly half its guns at once. It is generally considered best to fire at the *water line* of the enemy's ship, (between wind and water), with a view to sink him; or else at the foot of his masts, with a view to cut them away. Each vessel also strives to obtain a

* Of Naval Gunnery, which differs only in its details from that of the Artillery, we have no room here to treat.

position, or watch the time, for *raking* the other; that is, for firing lengthwise of the antagonist ship, especially as she turns in tacking or wearing; such fires being very effective. It often happens, that one of the two ships is so disabled, as to be obliged to haul down its colors, in token of surrender, without coming in contact with the other: if not, the last resort is *boarding;* by running one ship afoul of the other; when the men fight hand to hand, with boarding pikes, cutlasses, and small arms; and headlong valor, oftener than numbers, decides the contest.

§ 3. The *Manœuvres of Fleets*, consist in the arranging of several vessels in prescribed order; and much resemble the evolutions of artillery batteries, or of large bodies of troops. When several vessels of war are to act in concert, it is of course necessary that they should all be placed under one commander, who in foreign services has the title of *admiral*, or, if commanding a squadron, that of *commodore*. The ship in which he sails, has a separate captain, like the others; and is called the *flag ship*, because it bears the flag of the chief commander. His orders are conveyed to the other vessels, by preconcerted *signals;* which are usually small flags, pennons, or streamers, of different colors, or in different positions of the rigging; and, in the night, lights, or rockets, or the firing of guns at prescribed intervals of time. Fleets are often attended by transports, or store ships; and they sometimes act as convoys to merchantmen, when their cargoes are of national value.

Fleets often manœuvre in one or more *columns;* all the ships tacking, or making sail, or taking in sail at the same time: and the distance between the ships may vary, from a *cable's length*, to a third of the same, that is, from 120 to 40 fathoms, according to circumstances. When there are two or more columns, they should be so far apart that a line drawn from the ship at one end of one column, to the ship at the opposite end of the next, would make an angle of two points, or $22\frac{1}{2}°$, with the direction of either column. Generally, the van-guard forms the weather, or windward column; and the rear-guard, the leeward column: but this order is sometimes changed. Among the other orders of sailing, besides in line, the triangular order, of the ancients, is perhaps the most important. The particular evolutions by which the different ships preserve their prescribed place, in these orders, we have no room here to describe.

In the *order of battle*, the ships are generally drawn up in line; under easy sail, and on parallel courses. Here, as in the case of single ships, it is deemed an advantage to have the weather-gage; though this is sometimes lost, even at the moment of engaging, by an unforeseen change of the wind. The two fleets usually come into action with the wind oblique, or nearly abeam; and they formerly arranged themselves in two parallel lines; each ship exchanging broadsides with those she passed, and perhaps finally engaging with a single adversary. The more approved method is, as in Strategy, to concentrate if possible an overwhelming force against one portion of the enemy, and thus vanquish him peacemeal. A favorite manœuvre for this object, recommended, if not invented, by Mr. Clerk, is to *break the line* of the enemy, by an oblique attack; when the rearward portion of his ships, separated from the rest, may be captured with comparative ease, while the others are too far distant to aid them. This method was practised by Rodney, in the West Indies; and also by Nelson, in the battles of the Nile, and Trafalgar: its excellence, therefore, may be considered as fully established.

Note to page 503. The formation by threes is that prescribed in Herries' Cavalry Tactics; but the formation now adopted in the United States service is by *fours:* four men of the front rank wheeling as one, and being followed by four men of the rear rank; thus forming a column of four men abreast, to march by a flank.

XVI. DEPARTMENT:

CALLOTECHNICS.

In the department of Callotechnics, we comprehend those arts of ornament and amusement which relate to material objects, and hence depend upon materials and instruments for their exercise. The name is derived from the Greek, καλος, beautiful, or καλλος, beauty; and τεχνη, an art: and the term Fine Arts, is chiefly applied to this group; which is here made to include Printing, Painting, Sculpture, Music, and Argics, or active amusements. These arts have close relations with Poetry and Romance, or Callography; and they are accordingly assigned to the final place in the study of the material world, as Callography was in the intellectual: but they differ essentially in the means which they employ to produce the same ideas or emotions; the one acting through the medium of the senses; the other directly upon the imagination.

Painting and Sculpture, have many principles of taste in common not only with Architecture and Horticulture, which are sometimes ranked as fine arts, but also with Vestiture and Furniture, in their more ornamental productions. There is, however, this distinction between them; that while these latter arts are chiefly subservient to utility, or the physical wants of man, the former are designed chiefly for intellectual gratification. This distinction also applies to Music, and to Argics, including gymnastic exercises and games of chance and skill: and it may be extended, though with less force, to the art of Printing, for which the present department has seemed the most appropriate place. The close connection of writing and printing with drawing and engraving, is another reason for the arrangement here adopted; especially as books, the joint production of these arts, are really specimens of the Fine Arts, and greatly contribute to our intellectual gratification.

The characteristic arts, embraced in this group, have often been termed *Imitative Arts;* a term which belongs to them in common with various others. It is true that Painting and Sculpture imitate shapes and colors, and Music imitates sounds and motions; and hence arises one source of the pleasure which these arts afford. But they are imitative in a higher sense than this; that is to say, in copying abstract nature, and representing objects not merely as they do exist, or have existed; but as they might be supposed to exist, under any imagined circumstances or conditions. In this sense, they are properly termed *Creative Arts;* as producing representations which have no original in nature; and thus enlarging the boundaries of human conception. But while venturing into this sphere, it is necessary that they should be controlled by the principles of pure taste, and never lose sight of probabilities, or at least of possibilities, in their imaginative excursions.

Of the Fine Arts, as of Ornamental Literature, it may be said, that they spring from the constitution of human nature; and though not absolutely necessary to its physical existence, yet they have in all ages served to develope its mental powers, and to promote its highest enjoyments. By furnishing a pleasing recreation, they have often kept the young mind from wandering in forbidden paths; while age has derived from them the vigor of the bow unstrung. But it is rather to the sentient than to the reasoning powers of our nature that they address themselves; and hence, if rightly directed, they have power to soothe the stormy passions, and calm the troubled breast; or to warm the heart to goodness, and implant the seeds of virtue and piety; or to rouse the soul to action, and incite it to the performance of deeds of daring and of glory. That they have often been abused, and applied to unworthy purposes, must ever be a subject of regret, to virtuous minds: and it furnishes a reason for their being legally and morally scrutinized; but none for their neglect or extirpation.

To compare the relative merits of these arts, or to give a preference either to them or to Rhetoric, Poetry, or Romance, we deem unnecessary and invidious; as each admits of masterly skill in its own sphere; and the best productions of each branch may well vie with those of the others. Of sensible forms, Painting may give more exact ideas than Poetry; but, for this very reason, the effect may be less imposing; because deprived of the charm or spell which imagination casts over objects half revealed. The effects of Music, are generally less definite than those of either poetry or painting: but still they are often not the less pleasing; as the very vagueness of their impressions leaves the mind only the more free to follow any train of thought, or feeling, which they may excite, or with which they may harmonize. This fact reminds us that all these arts should be kept within their proper bounds, and enjoyed moderately; else instead of relaxing and invigorating the mind, they will only enervate it, by the thraldom of mental dissipation.

The history of Callotechnics, will be more appropriately distributed among its different branches. The most important topic in this history, is the invention of the art of Printing; by which knowledge, once confined in manuscripts, and accessible only to the privileged few, is now disseminated in multiplied copies, widely as the winds are, and almost as free. Though of later date than the invention of the compass, and of fire arms, it has exercised an influence not less important than theirs, on the destiny of the world; and when the mighty power of steam arose, and winged its way over sea and land, the genius of Printing at once took advantage of its progress, and subsidized it as the carrier of her literary treasures. Of the other Fine Arts, none has made substantial progress, in modern times, excepting Music; but this art, next to Printing, has, we think, exerted the greatest influence upon national character. We are of the opinion that music does not form the national character, so much as it is formed by it: yet each has an influence upon the other. The general fact that the most enlightened nations have made the greatest progress in the arts of this class, forms, we think, a substantial argument in favor of their liberal but judicious cultivation.

We proceed to give some further illustrations of Callotechnics, under the branches of Printing; Painting; Sculpture; Music; and Argics; the latter comprehending various games and active amusements.

CHAPTER I.

PRINTING.

We use the term Printing, in a generic sense, for the want of another more appropriate, to include the arts of communicating ideas by means of letters and other symbols. The name is derived from the Latin, *imprimo*, I imprint or engrave; and this from *premo*, I press; probably alluding originally to the impression of seals or signets. We here comprehend, besides printing, properly so called, the arts of writing and engraving, bookbinding, and telegraphic communication: all of which have close relations with printing, and are subservient to the same general object. The arts of this group have also a reference to Glossology, or the study of Languages; and the art of Writing might be introduced under that department, as subservient to the study of it, were it not more closely related here. These arts are, collectively, of the highest importance, as means for the diffusion of knowledge; by which the thoughts, inventions, or discoveries of any individual, may speedily be communicated to the whole civilized world.

The most ancient writings now remaining, are those engraved on *stone;* as the Egyptian hieroglyphics; and the arrow-head characters of Persepolis and Babylon, which have but recently been decyphered. The Egyptians also wrote on *papyrus*, a kind of paper made from a reed growing along the river Nile; and recent mention is made of a manuscript at Turin, of this material, written as early as 1700 B. C.; though we are not informed of its contents.* It is highly probable that the books of Moses were written on papyrus; though possibly on prepared linen. The poem of Hesiod, entitled Works and Days, is said to have been written on *leaden tablets*, and kept in the Temple of the Muses. Tablets of brass, ivory, or wood, were also used by the Greeks and Romans; being either covered with wax, and written upon transiently, with the *stylus*, or iron point; or else being written upon permanently, with ink, and a *calamus*, or reed, for a pen. *Parchment*, made from the skins of animals, was invented at Pergamus, 200 B. C.; when papyrus could not be procured from Egypt. *Paper*, was made of cotton, by the Arabians, as early as A. D. 704: and they introduced its manu-

* Dr. Jenks's Comprehensive Commentary; I; 213; where reference is also made to other ancient Egyptian manuscripts on papyrus.

facture into Europe; where paper was first made of linen rags, about 1320. The *bark* and *leaves* of trees, are still used as writing materials by some half-civilized nations or tribes.

The art of *Xylographic*, or block printing, by means of engraved wooden plates, was known to the Chinese, it is said, 1100 B. C. It was reinvented in Europe; we believe by Laurentius Jansen, called Coster, at Harlaem, as early as 1430; but the great invention of *typography*, or printing with moveable types, is we believe due to Guttenberg, otherwise called Gansfleisch, who was assisted in improving it, by Schœffer, and perhaps by Faust. The date now generally assigned to this invention, is 1440: and the first printed edition of the Bible was completed in 1455. The invention of *stereotype printing*, from cast metallic plates, is due to Vander-Mey, of Holland, who first matured it about 1690; and to Ged, of Scotland, who reinvented it in 1725. The invention of the printing press is ascribed to Guttenberg; but the invention of *printing machinery*, or the power press, commenced in 1790, with Mr. W. Nicholson; and was first successfully applied by Messrs. Bacon and Donkin, in 1813.

The art of engraving on wood, is also said to have originated in Germany, with the stamping of cards, as early as 1360. Engraving on copper appears to have been invented by Finiguerra, of Italy, as early as 1452; and it was known in Germany as early as 1460. The engravings of Schoen, (or Schoengaur) of Antwerp, are among the earliest extant. Etching was practised by Albert Durer, as early as 1518: Mezzotinto engraving was invented by De Siegen in 1643, or Prince Rupert, in 1649; and Lithography, by Senefelder, in 1796. Bookselling, as a distinct profession, commenced with Otto, of Nuremberg, in 1516. Newspapers originated in Venice, in 1563; and the first in England was printed in 1588. The first printing press in the United States was brought to Cambridge, Massachusetts, in 1639. The use of signals to convey information, was known to the ancients; and a Telegraph was contrived by the Marquis of Worcester, as early as 1663; but the first actual Telegraph was put in operation in 1794, by Chappe, of France.

The branch of which we are now treating may be distributed under the heads of Writing; Printing; Engraving; Paper Making, and Book binding; and Telegraphics, or telegraphic communications.

§ 1. The art of *Writing*, also termed *Chirography*, is too simple to require any long explanation here; but we may remark that its greatest perfection consists in its free and easy style, its neatness and regularity of appearance, and especially its ready legibility. Much depends upon having a good pen, which is best made from a strong and elastic quill; and much depends upon a good position of the hand and body,—such as freely to admit of the proper motions. The body should be held as erect as possible, to prevent distortion of the spine; and the table or desk should be so low that the right fore arm may rest upon it, without being carried very far from the side. The pen should be so held between the thumb and first two fingers, that the thumb can be bent with ease, and that the end of the fore finger may be raised from the pen without letting go of it. The learner should commence with the elementary parts of letters; and we would advise that he should form them, from the beginning, not much larger than of the ordinary size in writing; as the hand becomes thereby the sooner accustomed to the requisite motions.

Stenography, or Short Hand Writing, is an interesting art; by the aid of which, the accomplished Stenographer can record most of the words of an orator, as fast as they flow from his lips: but it is an art which requires too much practice and dexterity in writing, and too much skill in reading, to admit of its ever coming into general use, even among professional men. The principles of Stenography, consist in selecting the simplest possible distinct characters, such as can be made the most rapidly with the pen, to represent the letters; or, when standing alone, to represent certain selected words, of frequent occurrence. All silent letters, and most of the vowels are omitted: as *hvn* for heaven; *angl* for angel, or angle:—and, in order to keep pace with a public speaker, it is often necessary to omit minor words or particles entirely; supplying them afterwards from memory, or the context; as *ur fthr w. n hvn*, for Our father who art in heaven. It will at once be seen, that the advantage of these abbreviations is counterbalanced, for common purposes, by the increased difficulty of reading what is thus written; imperfect as it necessarily must be, in following a public speaker.

§ 2. The earliest mode of *Printing*, and that which is still practised in China, has been called *xylographic*, from the Greek ξυλον, wood; because the letters are all cut on wooden blocks, after the manner of wood engraving. Each block, as prepared by the Chinese, usually contains two pages; and the printing is executed by inking the letters with a brush, and Indian ink, then laying on the paper, and rubbing it gently over, so that it may receive the ink from the letters. Our common printing is styled *typographic*, or typography; because done by means of *types;* which are small elongated pieces of soft metal, (lead and antimony), cast in a matrix or mould, and each bearing a letter projecting in relief from one end of it. The types are distributed in the compartments of a receptacle, or drawer, called the *case;* those letters which occur most frequently, as *e*, *t*, and *a*, being placed nearest to the workman. The more common sizes of type are exhibited here in the margin; being used in printing their own names.

English.
Pica.
Small Pica.
Long Primer.
Burgeois.
Brevier.
Minion.
Nonpareil.
Pearl.

The process of setting up the types, to form a page, is called *composing*, and the workman who performs it, a compositor. When a few lines have been set up in a composing stick, held in the hand, they are then emptied upon the *galley;* which is a flat board made to hold them, standing, as they do, endwise, in compact masses: and when as many pages have thus been composed as will constitute a *form*, or print one side of a sheet, they are then arranged upon the imposing stone, and locked up, or wedged together in an iron frame called the *chase;* after which they are ready for the printing press. The ink, made of boiled linseed oil, and lampblack, is applied either by means of *inking balls*, made of leather, firmly stuffed with wool, and provided with handles ; or else by means of elastic rollers. The paper is then laid on, and strongly pressed ; and thus the printing is executed, on one side of the sheet at a time. A single copy is first printed, called the *proof;* by reference to which, any errors in the composition are corrected, before any more impressions are taken.

In the process of *stereotype* printing, a page of moveable types is set up, as already explained, and then covered with a paste or cream of calcined gypsum, freshly mixed with water ; which soon hardens, and being then removed, forms a *mould*, from which the whole page may afterwards be cast, in one solid piece. The common *printing press*, consists essentially of a frame, supporting a *bed*, or firm table, on which the form, containing the types is placed ; and a *platten*, or strong metallic plate, which, being moved by a lever, on the principle of the screw or inclined plane, presses the paper hard against the types, to take the ink therefrom. In the printing machine, or *power press*, the types are inked by means of rollers ; the paper supplied by passing over revolving cylinders; and in some cases the types themselves are arranged around a cylinder, which turns as it receives the paper.

§ 3. The art of *Engraving*, presupposes an acquaintance with Drawing, and Perspective; but we shall here treat only of its mechanical processes ; reserving those auxiliary studies for the following chapter, to which they naturally belong. *Xylography*, or engraving on wood, is performed by first making a drawing of the intended design, on a flat fine grained block, of boxwood in preference, cut across the grain, and planed very smooth. Those parts which are to make no impression, or leave the paper white, are then cut away with a *graver*, a kind of chisel, pushed forward by the hand ; while those parts which are to receive the ink, are left projecting, as in common types. Sometimes, an engraving is made at once on soft metal ; but more frequently, plaster casts are made from the wood ; and in this way as many metallic copies, like stereotype plates, may be founded, as are desired, for use in common printing.

Copper plate engraving, differs from that on wood, in having the parts that are to retain the ink and blacken the paper, cut into the surface, instead of being raised above it. The ink, applied by means of a roller, at first covers the whole plate ; but it is then wiped off from the smooth surface, before the paper is applied, which, by severe pressure, in the roller press, receives the ink from the sunken part, in the process of copper-plate printing. *Line engraving*, is performed by means of the graver, already mentioned, or the dry point, of steel, made hard and sharp. *Dot engraving*, or stippling, is performed by pricking the plate, either with the dry point, which produces circular dots, or with the graver, which makes them triangular. *Etching*, is executed by corroding the metal with an acid, instead of cutting it away mechanically. The whole copper plate is first covered over with a resinous varnish ; which is then scraped off from those parts which are to be bitten, or eaten away by the acid. Any part, after being slightly bitten, may be stopped out, by washing off the acid, and covering that part with varnish; and the rest may then be bitten deeper, at pleasure.

Mezzotinto engraving, is executed by first roughening the copper surface all over mechanically, and then burnishing, or smoothing down again, those parts which are to be light in the picture. *Aquatinta* engraving, is usually performed by sprinkling the plate over with finely powdered mastic, and then heating it till the particles soften and adhere to the plate. Those parts which are to be entirely white, are then completely covered over with varnish, as in etching; and the specks of varnish on the remaining part, protecting numerous small points from the acid, cause the dark parts of the prints to be covered with fine white dots, which produce a pleasing effect. The use of *steel plates*, instead of copper, for engraving, was, we believe, introduced by our countryman, Mr. Perkins. The plates are rendered soft for the engraver; but afterwards hardened by tempering, and thus rendered very durable. *Lithography*, or stone printing, is executed from a simple drawing, made on porous, calcareous stone, with an oily ink or crayon, which drawing is firmly fixed, or rendered permanent, by the action of a dilute acid. On moistening the stone, the oily lines or dots remain dry; and then, on applying the ink, it is repelled by the wet parts, and adheres only to the drawing; which is thus transferred to the paper, by means of a roller press.

§ 3. The art of *Paper making*, resembles that of cloth making, in producing extended surfaces from vegetable fibres; but differs so much in the mode of producing them, and in the use to which they are applied, that it may properly be mentioned here. The best paper is made of white linen rags; which are first washed and ground in the *paper mill;* in which they pass between sharp revolving knives or cutters, till they are reduced to a fine pulpy substance, uniformly diffused in the water. For paper made by hand, a quantity of this pulp is taken up on a sieve; and, the water running through, it is left as a continuous sheet, which is then removed and pressed. For *machine paper*, the pulp is received on a revolving, cylindrical sieve; which discharges the water, but retains the pulp, and delivers it on another cylinder, in a long sheet: and it is then pressed, by passing it between rollers. *Writing paper*, before being pressed, is sized, with a solution of glue or gelatin, which renders it smoother, and prevents common ink from spreading upon it. *Printing paper*, is usually unsized, and therefore bibulous, or capable of absorbing water freely.

The process of *Book binding*, commences with the folding of the sheets into leaves, and the arrangement of them, according to the *signatures;* which are letters, or numbers, placed at the bottom of the pages, at certain intervals; by reference to which, the labor of counting the pages is avoided. The leaves are then stitched together at the back edges; during which operation they are kept in place by a frame, holding the threads to which they are fastened: and the whole back is firmly compacted, by covering it with glue. The cover is then applied, and secured to the body of the book, by the ends of the threads, left protruding for that purpose. The blank leaves at the beginning and end of a book are technically called *fly leaves;* and ought to be of sized paper, that they may be written upon with common ink. A book is said to be in *folio*, (*2io*), when a sheet is folded into two leaves; in *quarto*, (*4to*), when a sheet makes four leaves; in *octavo*, (*8vo*), when a sheet is folded into eight leaves; and in *duodecimo*, when twelve leaves are contained in one sheet. Every book intended for reference, should contain a table of contents at the beginning, and a copious alphabetical index at the close.

§ 5. The *Telegraph*, is a contrivance for communicating with persons at a distance, by means of a system of preconcerted signals. That invented by Chappe, and called by him the *semaphore*, or signal bearer, consisted of a wooden bar, called the long indicator, supported at the top of a strong mast, and capable of revolving in a vertical plane, on an axle passing centrally through it. It was moved by means of a cord, passing over a pulley, attached to the same axle; and at each end of it were smaller arms, called indicators, attached to it by an axle, and capable of turning around it, so as to take any required direction, by means of cords and pulleys. This apparatus, since called the T *telegraph*, admits of about 100 different signals; each of which may be made to represent either a letter, a number, a word, or a sentence. The stations are usually from five to ten miles apart; and in this way information has been conveyed at the rate of more than 500 miles in a minute.

The semaphoric telegraphs, erected by Mr. Parker, in Boston Harbor, consist of tall masts, having each three moveable arms, one at the top, called the indicator, and the others at different heights below. Each of these arms may be placed in six different positions, making a total of 216 simple combinations, which by compounding, or taking them two or more at a time, may express any desirable number of words or sentences. In place of these, and in correspondence with them, there are six marine flags, of blue and white differently disposed, which, with a seventh, called the conversation flag, used to announce an intended conversation, constitute a *Marine Telegraph*, of great service occasionally to ships at sea. A Telegraphic Dictionary is prepared, answering to these signals; by means of which, an intelligent person may, in a short time, be able to understand the indications of the telegraph if it be visible.

CHAPTER II.

PAINTING.

Painting, in its generic sense, including drawing, is the art of representing objects on surfaces, by means of lines, shades, or colors. The name is derived from the French, *peindre*, to paint; and this perhaps from the Latin, *pingere*, of the same meaning. In a more limited or specific sense, painting signifies the representation of objects by means of their appropriate colors: but as this cannot be done without giving their outlines, which constitutes *drawing*, and their chiaroscuro, or lights and shades, by the process of *shading*, these latter processes are included, together with coloring, in the present branch of the fine arts. It comprehends therefore the principles of engraving; the mechanical processes of which we have already explained. (p. 519.) Painting holds a high rank among the ornamental arts; often addressing the understanding as well as the feelings; and hence subserving important purposes in science and morals, as well as contributing to relaxation and amusement.

Drawings, are made with the pen, pencil, or crayon: but paintings, strictly so called, are executed with the brush; either in water colors, on paper, or ivory, sometimes called washing; or in a still stricter sense, in oil colors, or distemper, on canvass, or on walls, or the like. A picture shaded with only one color, is called a *monochrome;* in contradistinction from *polychromes*, shaded with various colors. As regards the subjects represented, painting is designated as flower, fruit, shell, or game painting, all in still life; *landscape*, and *marine* painting, either from nature or fancy; *portrait* painting, which requires both ease and accuracy of execution; and *historical* painting, which demands the highest powers of the pictorial art. Portraits, are painted either in *miniature*, that is, very small; or in half size; or in full size, whether full length, or not: and as regards the position, they are either in *profile*, giving a side view, or frontal, giving a front view of the face. Historical paintings, comprehending allegorical and mythological, require for their success, the choice of a noble or striking subject, and of the best point of time, and of view, for its exhibition.

Painting or drawing, in a rude form, appears to have been practised in the earliest times, and by all the nations of antiquity. Thus, among the monuments of Egypt, the walls of temples and caverns, are often found painted with figures of men and animals, in colors which have retained most of their brilliancy, notwithstanding the lapse of ages. Most of these paintings, like those of the Mexican Indians, are historical and hieroglyphical; portraying the exploits of warriors and the worship of the gods. This art was introduced into Greece, it is said, by Euchirus, long before the Trojan war: but the first Grecian painting, in various colors, appears to have been the *Battle of Magnete*, painted by *Bularchus*, about 720 B. C. Zeuxis and Parrhasius, famed for their rivalry, brought this art to great perfection, in the age of Pericles; and the picture of *Venus Anadyomene*, or Venus rising from the sea, by Apelles, about 330 B. C., was deemed the most graceful and faultless painting of ancient times. Both the Greeks and Romans appear to have attached less value to this art, than to Sculpture; perhaps because it was less intimately connected with their religious institutions. The ancient art of *encaustic painting*, consisted in mingling the colors with wax, and applying them to the wall, or other surface, in a melted state.

The art of painting was revived, in Italy, by Cimabue, who flourished at Florence, about A. D. 1270. He copied or studied the ancient artists; and improved the Italian style so much, that he has often been termed the father of this art. After his time, four different schools, or styles of painting, arose in Italy, distinguished as the Florentine, Roman, Venetian, and Lombard. The *Florentine* school, commenced with Cimabue; and reached its acme in the works of Michael Angelo, and Leonardo da Vinci. It was characterized by the gravity of its subjects; and by correctness of design, and boldness of composition and coloring. The *Roman* School, rose and flourished with Raphael; and breathed its last with Maratti, who repaired Raphael's fading pictures. This school was remarkable for gracefulness of design, and chaste, harmonious coloring. Salvator Rosa of Naples, and Carlo Dolci, who painted at Florence, belong, as regards their style, to the Roman School; though the latter is usually numbered with the Florentines. The *Venetian* School, famed in the works of Giorgione, Titian, Paul Veronese, and Tintoretto, was characterized by simplicity of design, but richness, if not gorgeousness of coloring. The *Lombard* School, was of later origin, and numbered among its masters, Correggio, the Carracci, Guido, and Domenichino. It was generally distinguished by harmony, grace, and expression; but its style was less settled than that of the preceding schools. Caravaggio, is, by some, regarded as the founder of another school, termed the natural; as he professed to imitate nature, without regard to ancient art.

The use of oil, for mixing and applying colors, was unknown to the ancient painters; and its invention has been attributed to John Van Eyck, or John of Bruges, in Flanders, about A. D. 1410; though some writers claim the honor for the city of Venice. The *Flemish* School of painting, is renowned in the works of Rubens and Vandyke; which are remarkable for their accuracy in details, and the minuteness with which they are finished; as well as for richness of coloring, and freedom of design. The *Dutch* School, though it may boast of a Rembrandt, is generally inferior to the Flemish: but the *German* School, as illustrated by Martin Schoen, Hans Holbein, and Albert Durer, is more original and wild; being founded on Gothic taste, but combining Flemish accuracy with Italian coloring. Of French painters, we may name Cousin as the earliest, and Poussin as probably the greatest. Claude Lorraine was born in France, but spent his life chiefly in Italy, and is usually classed with the Lombard school. England also can boast of her Hogarth and Reynolds; Scotland of her Wilkie; and our own country may name her Copley, Stuart, and West; without referring to living artists of deserved celebrity. A few of the more celebrated paintings will be named at the close of the present chapter

Our remaining remarks on this art, will be comprehended under the heads of Drawing; Shading; Coloring; and Pinacography, or Descriptions of remarkable Pictures.

§ 1. The art of *Drawing*, consists in the representation of the outlines of objects; and depends upon the principles of Descriptive Geometry. (p. 331.) We here resume the subject of Scenographic Drawing, or *Perspective;*—of which a correct idea may be formed by looking through a window, and observing the relative positions, on the glass, at which the different external objects appear. The glass corresponds to the *perspective plane*, or surface of the drawing; the position of the eye is called the *point of view;* and lines drawn from the eye to the various points of the original or external objects, are called *visual rays;* which, by their intersections with the glass, form the *perspective* required. Hence, a simple mode of drawing in perspective, consists in using a vertical frame, divided by cross threads into small squares, with a sight vane placed behind it, to fix the position of the eye while looking through it. The paper being divided, by pencil lines, into corresponding squares, we have only to draw in each of these, the objects which are seen in the corresponding squares of the vertical frame; which, from its use, is called a *perspectograph.*

In perspective, objects appear smaller when they are more distant; and their appearance changes, as we change our point of view. When a near object hides a more remote one, the part which is hidden, is not represented; as the nearer object fills its place. In general, lines which are truly *vertical,* are drawn vertical in the picture; but *horizontal* lines appear oblique, unless they are precisely on the level of the eye, or else parallel to the plane of the picture. If they are above the level of the eye, their farthest end appears the lowest: otherwise the effect is reversed. Lines which are truly parallel, and recede from the observer, are drawn converging, in perspective, towards their *vanishing point*, at which, if they were infinitely prolonged in reality, they would all appear to meet upon the picture. A line drawn through the eye, and parallel to them, will meet the perspective plane, or picture, in their vanishing point, which is thus found. Objects seen obliquely, appear smaller than their real size; and are then said to be *foreshortened;* as when a carriage wheel, seen obliquely, is represented by an ellipse; or a square represented by a trapezoid. Of the general principles of design, or composition, we have no room here to speak.

§ 2. The art of *Shading*, called by the French *clair-obscure*, and by the Italians, *chiaro oscuro*, consists in making the different parts of the picture either light or dark, according to the actual appearance of the objects represented; that is, in expressing the lights, shades, and shadows, which depend on the direction and intensity of the light. The *lights*, technically so called, are the brightest parts of a picture: the *shades*, are those parts of objects which are turned from the light; and the *shadows*, are those parts from which the light is intercepted by some other object. The *middle tints*, are intermediate between the lights and shades; and the *reflected lights*, are diminutions of the shade, produced by reflection from adjacent objects. The *brilliant points*, or parts, are those which reflect their light directly to the eye; being the very brightest parts of the picture. The *dead points*, are those which receive no light, either direct or reflected; and hence are the darkest parts of the picture; by which all the other shading should be adjusted.

The shading is easiest, and most distinct, when all the objects are lighted from only one source; as the sun, or an elevated window; by which *cross lights* are avoided. In rounded bodies, the shades vary gradually: but in angular bodies the transitions are often abrupt, and extreme. Shadows generally terminate gradually; and the faint, indistinct edge, in which the transition takes place, is called the *penumbra.* A bright object, seen in front of a dark one, that is, on a dark ground, appears to stand out from the picture, and is then said to be relieved, or *in relief*. When objects are seen at a distance, the intervening air makes the light parts seem darker, and the dark parts lighter, than if they were near; thus reducing them more nearly to one uniform shade. This effect, which causes distant mountains, or the ocean, to blend, almost, with the sky, is called *aerial perspective*. Shading may be executed with a pen, pencil, crayon, or brush; and by means of lines, or dots, or a continuous mass of color, as in drawings washed with Indian ink.

§ 3. The art of *Coloring*, consists in representing the various colors of the objects in a picture; of course, in connection with drawing and shading. The theory of colors has already been noticed under the head of Optics; (p. 359); but we must here add, that the colors of individual objects are greatly modified by the light reflected from other objects which surround them. Thus, a person sitting by the side of crimson drapery, would receive a red tinge therefrom, distinct from his natural color; and still more so from what he would receive, were the drapery of a gloomy hue. The brilliant parts of a picture, are painted by diluting the natural color with white: but the dark parts require a mixture of some darker pigment, harmonizing with the natural color; which last is found only in the middle tints. If the colors of a picture are generally bright, with feeble shades, they give it a *light tone;* but darker colors produce a deeper tone; and any one color predominating, gives its own tone to the picture. In portrait painting, much depends on the proper choice of the *back ground*, or part surrounding the principal figure; which should generally be of a neutral or mixed tint, rather than of a decided color.

Water colors, are finely ground, and mixed with gum arabic, to give them consistency and cohesion; but oil colors are mixed with linseed or other vegetable oil, which has been previously boiled, to render it siccative, or capable of drying speedily. Vermilion, chrome red, Indian red, carmine lake, madder lake, burnt sienna, raw sienna, (terra di sienna), chrome yellow, gamboge, yellow ochre, chrome green, Brunswick green, Prussian blue, ultramarine, indigo, ivory black, Indian ink, umber, bistre, flake white, and zinc white, are among the pigments used in coloring pictures; most of them being suitable either for water colours or oil. In *distemper* painting, which was much practised before the use of oil, the colors are mixed with glue, or size; and in *fresco* painting, the colors, thus mixed, are applied to freshly plastered walls, and imbibed by the plaster before it becomes dry. *Mosaic* work, is executed with small blocks of marble, glass, or other substance, attached to a proper ground; each block having the color of that part of the picture or design which it contributes to form.

§ 4. Under the head of *Pinacography*, we propose to name a few of the most remarkable paintings; of which this would be the place for a full description, in a more extensive work. The name is suggested by the term *pinacotheca*, signifying a picture gallery, derived from the Greek πιναξ, a picture. It is a subject of regret, that many of the finest paintings of the oldest masters are much decayed; and unless perpetuated by means of superior copies, their excellence will, in time, like that of the Grecian paintings, become a mere matter of history. Of the Florentine school, the most celebrated productions are the *Last Supper*, by Leonardo da Vinci; and the *Last Judgment*, by Michael Angelo Buonarotti. The former represents our Saviour seated with the twelve Apostles, and warning them of his betrayal; while the latter portrays the final resurrection of the dead, representing upwards of three hundred figures, on a wall forty feet wide and fifty feet high, in the Sistine chapel of the Vatican. The ceiling of the same chapel, contains a picture of the *Creation*, also by Michael Angelo.

Of the Roman school, the most celebrated production is the *Transfiguration*, by Raphael; which, with many other paintings by him, is preserved in the Vatican. His *Madonna della Seggiola*, representing the Mother of our Saviour seated and holding the Infant Jesus, is now in Paris; and his *Cartoons*, or drawings of Scriptural subjects, which served as models for the tapestry of the Pope's chapel, are now preserved at Hampton Court, in England. Among the best paintings of Carlo Dolce, are *St. Cecilia*, playing the organ; and Christ blessing the Bread and Wine, or the *Eucharist;* both of which are now at Dresden. Of the Venetian school, Titian's *Last Supper*, and *Christ crowned with Thorns*, are very celebrated pictures; and, after these, we may name the *Crucifixion*, by Tintoretto; the *History of Esther*, by Paul Veronese; and the *Fountain piece* of Giorgione. Of the Lombard school, we may mention Corregio's picture of *Night*, or the shepherds seeking the infant Jesus; and especially his *St. Jerome and the Virgin*, which rivals the works of Raphael. The fresco paintings of *Bacchus and Ariadne*, by Hannibal Carracci, at Rome, are of great size, and justly celebrated. Guido is renowned for his *Aurora;* and Domenichino for his *Martyrdom of St. Andrew*, which rivals a picture of the same by Guido.

Of the Flemish school, the *Descent from the Cross*, by Rubens, is a fine picture; but he found a more congenial theme in his mythological allegories, painted in the Luxembourg palace, in honor of Mary de'Medici. More than three hundred engravings have been made from his paintings. Vandyke excelled in portraits; but his *Crucifixion*, and *St. Augustine*, are works of merit, among many others. Of the Dutch school, we may name the picture of *Tobias and the Angel*, and that of *Christ at Emmaus*, by Rembrandt, as among the best specimens. Of the German school, the picture of the *Dance of Death*, by Hans Holbein, is very celebrated; and among the best paintings of Dürer are his *Adam and Eve*, and *Christ bearing the Cross*. Of the French school, the *Seven Sacraments*, and the *Deluge*, painted by Nicholas Poussin, are all that we have room to mention. Claude Lorraine excelled in landscapes; and in marine painting, Vernet is unsurpassed. Among English paintings, the *Ugolino*, and the *Death of Cardinal Beaufort*, by Reynolds, perhaps rank highest; and of similar style are the pictures of *Christ Rejected*, *Christ Healing the Sick*, and *Death on the Pale Horse*, by our countryman West; the last that we have room to mention.

CHAPTER III.

SCULPTURE.

Sculpture, in its most general sense, is the art of imitating or producing tangible forms, by the carving, moulding, or casting of solid materials. The name is derived from the Latin, *sculpo*, I carve, or grave; as the carving or cutting of statues, from marble or stone, has long been the most prominent division of this art. Sculpture has also been termed the *plastic art;* but this appellation belongs more properly to moulding or modelling alone; which is only one portion of the entire art, corresponding to design and composition in Painting. Sculpture, like Painting, is partly imitative, and partly inventive. It preserves the resemblance of objects in nature, as well as ideal forms; the features of men who darkened nations when they died, as well as the imaginary beings of mythology; and the noble or affecting descriptions of the historian, as well as the sublime or beautiful conceptions of the poet. Sculpture and Painting have the same object; but they effect it by somewhat different means.

The most important productions of Sculpture, are *statues*, or representations of persons, either draped or nude; and next to these, *busts*, which represent only the head and shoulders. Statues are said to be *reduced*, when much smaller than the natural size; *heroic*, when slightly larger than the natural size; and *colossal*, when they far exceed the size of the person represented. They are also termed equestrian, or pedestrian, according as they represent the person on horseback, or on foot. *Relievos*, are figures partially sculptured, as if projecting from a tablet, or back ground. They are called *alto-relievos*, when the figures project as much as one half of their dimensions; *mezzo-relievos*, when the figures are less prominent; and *basso-relievos*, when the figures project but slightly above the surface. Gems are often sculptured in relievo; and when the figure is cut from a vein of one color, leaving another color for the back ground, the work is called a *cameo*. Sculptures in which the figures are sunk below the surface, are called *intaglios;* such as seals, which produce an impression in relievo, on wax. Other objects of sculpture are vases; coats of arms, and military trophies; and monumental or architectural decorations.

Sculpture is an art of very ancient origin, and probably more ancient than Painting; traces of it being found among the earliest antiquities of the oldest nations. It appears to have been first applied to the carving of idols: and Laban is mentioned in the Bible, as having his *teraphim*, or images of household gods, as early as 1739 B. C. The remains of Egyptian sculpture consist of relievos, on the walls of temples and tombs; with colossal statues, lions, and sphynxes, often arranged in rows, exterior to the temples. Two of these statues, in the Memnonium at Thebes, are said to be fifty feet high; but their posture is stiff and constrained. The capitals of Egyptian columns, are often carved into the form of human heads; and in the caverns, at Phylee, Elephantis, and Silsilis, cut in the solid rock, those parts which are left to support the roof, are also carved into the form of statues; something like the Grecian caryatides. The same occurs in the ancient cavernous temples of Hindoostan, particularly at Elephanta, Ellora, and Salsette, where portions of the rock are left, in the form of demigods and elephants, to support the roof. The Persians had many works of sculpture, but their figures were always in drapery: and in Assyria, mention is made of brazen statues of Semiramis, Belus, and Ninus.

Sculpture, or rather modelling, was first practised in Greece, it is said, by Dibutades, a potter of Sicyon. The earliest statues, were little more than rounded blocks of wood, or stone, sculptured first with the head only, but afterwards representing the entire body. Dædalus improved on these rude performances, and produced statues so much like life, that he is by some regarded as the inventor of this art. Rhœcus of Samos, about 750 B. C. is said to have been the first who practised the casting of statues in brass; and Dipænus and Scyllis are said to have first used marble, instead of wood, or metal, for statues, at Sicyon, about 600 B. C. Grecian sculpture, reached its greatest perfection, in the hands of Phidias, under the administration of Pericles; and retained it until the death of Praxiteles, who was contemporary with Alexander the Great. The number of Grecian statues is said to have amounted to upwards of 30,000, when Greece was subjugated by the Romans; but many of these were afterwards removed to Rome. The ancient Etrurians made no small proficiency in sculpture; but the Romans were, for the most part, only copyists of the Greeks.

After the lapse of the dark ages, Sculpture was first revived in Italy, by the labours of Ghiberti, who died in 1455, and Donatello, who died in 1466. Michael Angelo was scarcely less celebrated as a sculptor, than as a painter; though all his works are in the same grand and severe style. Benevento Cellini, was alike distinguished as a sculptor, goldsmith, and engraver; and Bernini was also a sculptor of genius. To Canova belongs the high distinction of having rivalled the ancients in beauty, as Michael Angelo did in grandeur; and the mantle of the latter seems to have fallen on Thorwaldsen of Denmark. France has produced her Puget, whose style, though cold was grand and classical; and her Falconet, who wrote upon his art, as well as practised it, with ability. England may also boast of her Flaxman, Chantry, and Westmacott; and the names of Greenough, and Powers, already do credit, in this branch of art, to our own young republic.

Our remaining remarks on Sculpture, will be arranged under the heads of Modelling; Carving; Casting; and Glyphography, or descriptions of remarkable statues.

§ 1. The art of *Modelling*, consists in forming a representation of any object, out of some soft material, by pressing or moulding it with the hands, or proper instruments. It is the common practice of sculptors, before carving a statue in marble, or casting it in metal, to form a model of it in clay; which admits of repeated alterations, until the artist has exhausted his skill in perfecting it. In this process, genius, and inventive power, are mostly displayed; as the remaining process of transferring it to the stone, or making a cast from it, is chiefly mechanical. When a clay model is undertaken, if the proposed figure be large, a frame of wood or iron is erected, to give it support and strength. Upon this frame, the tempered clay is distributed, and shaped with tools of wood or ivory, until it has taken the form required. The clay hardens in drying; and if the figure be small enough, it may be rendered firm and permanent by burning or baking it, like pottery.

Modelling in wax, is executed in a similar manner; only requiring that the wax should be softened, by a gentle heat, in order to give it plasticity, and tenacity. The *wax figures*, often carried about for exhibition, are made of a light frame covered with beeswax; which, for delicate work, is bleached, and then colored with different pigments, in the same manner as for making wax flowers. Wax figures are very perishable, being easily soiled by dust, and deformed or melted by heat; and hence they are for the most part, rudely made, and of little value. The great principles to be observed in modelling, are, the choice of a suitable subject; of a suitable attitude and costume; the observance of harmony and proportion of the parts; of unity, ease, and boldness in the design: and of delicacy and freedom in the execution:—the final object being to produce some striking expression, or decided effect.

§ 2. *Carving*, or sculpturing, is most frequently executed in white marble; but statues of alabaster, serpentine, porphyry, freestone, and granite, are sometimes executed; and such are found occasionally among the remains of antiquity. Ivory is sometimes used for small objects, or parts of large ones; and wood was used by the earlier artists of Greece, before the introduction of marble. The material being provided, the sculptor begins by cutting with the chisel and hammer, until he establishes a point in the block, corresponding to some prominent point in the model. From this, he measures the exact distance and position of another prominent point, working delicately as he approaches it, to avoid cutting in too far. Proceeding in this manner, he knows where he may cut deeply, and rapidly; and the nearer he approaches the intended surface, the more frequent and cautious are his measurements.

Instruments have been contrived, to facilitate these measurements; such as compasses with three or more feet, to be applied first to the marked points of the model, and then to the corresponding points of the work; or a frame, with moveable arms sliding horizontally and vertically, fitted to the model, and another frame precisely similar, fitted to the block, to which the measurements are thus transferred. When a sufficient number of points is thus established, the surface between them is rounded and shaped by the judgment and skill of the artist. Occasionally, saws, and drills, or other perforating tools are employed; and the surface may be rubbed down with files, or sand paper, and polished with pumice stone, or putty of tin: but the ancient sculptors appear to have relied chiefly on the chisel, and to have finished many of their finest works with this tool alone.

§ 3. The *Casting*, or founding, of statues, is most frequently executed in bronze; but sometimes in brass, or in lead; or in variable mixtures of copper, lead, tin, and zinc. The moulds in which they are cast, are made of calcined gypsum and brickdust, tempered together; the latter serving to resist the heat of the melted metal, and prevent the mould from crumbling. The mould is formed in separate parts; which are afterwards united. When the casting is to be hollow, the mould is coated internally with soft clay, and the rest of the interior is filled with a *core*, of the same material as the mould. The mould is then taken apart, the soft clay removed, and the mould then readjusted; so that the melted metal, when poured in, occupies only the space from which the soft clay was removed.

Casting in *plaster*, depends upon the property which gypsum, or plaster of Paris, possesses; that when heated to about 300° Fah., it gives off the water chemically combined with it, and being then pulverized and moistened, it recombines with water, and speedily become a hard, solid mass. The mould, for such casting, is itself made of this plaster, applied to the original statue or model; which is previously oiled, to prevent the plaster from adhering. The mould may be formed in parts; and the cast itself, if of a complicated form, may also be made in parts, which are afterwards united. The mould is oiled internally, before the plaster, mixed with water to the consistency of cream, is poured in, and allowed to harden. Plaster casts may be varnished with a solution of soap and white wax, in boiling water, and, when dry, they may then receive a fine polish. When exposed to the weather, they may be protected by applying paint or oil, with which wax or rosin may be combined.

§ 4. Under the head of *Glyphography*, so named from the Greek, γλυφη, sculpture, we proceed to name a few of the most remarkable productions of this branch of the arts. The most wonderful Grecian statues, were those of *Minerva*, in the Parthenon at Athens, and *Jupiter*, in his temple at Olympus; both executed by Phidias. They were both of colossal size, wrought in ivory, and robed in cloth of gold. That of Minerva was 41 feet high, and held in its hand a statue of Victory, as large as the ordinary human figure. That of Jupiter was of nearly the same size. Next to these, we may name the colossal statue of *Juno*, at Argos, made of ivory and gold, by Polycletus, the rival of Phidias; and next to this, the colossal group of *Minerva*, presenting the deified *Hercules* to *Jupiter*, executed by Myron, at about the same period. Polycletus modelled the juvenile form, in his *Mercury;* and Myron, the mature athletic form in his *Hercules*. The statue called the *Dying Gladiator*, is ascribed to Ctesilaus, a contemporary of Phidias. Pythagoras of Rhegium created the ideal form of *Apollo*, of which the Apollo Belvidere is a copy; and Praxiteles, that of *Diana*. Praxiteles made two statues of Venus, one of which, the Cnidian, was nearly copied in the *Venus de Medici*, by Cleomenes. Scopas invented the groups of *Thyades*, or dancing Bacchantes: and the group of *Niobe and her Children*, is ascribed either to him or to Praxiteles. Lysippus cast the *Tarentine Jupiter*, of bronze, 60 feet high; and Chares, his pupil, is said to have made the *Colossus*, at Rhodes. The group of

Laocoön, is attributed to Agesander and his sons; and the *Farnese Hercules*, to Glycon.

Of modern sculpture, the *Moses*, of Michael Angelo is a sublime production; and his statues of *Morning*, *Noon*, *Evening*, and *Night*, are justly celebrated. Cellini executed a superior bronze statue of *Perseus;* and Bernini is remembered in his *St. Theresa* and *St. Bibiana.* Puget's colossal *St. Sebastian* does honor to French sculpture; and Falconet executed the colossal, equestrian statue of *Peter the Great*, at St. Petersburgh. Rauchmüller modelled the equestrian statue of *Frederick William* at Berlin: and the *Ariadne*, of Dannecker, is mentioned as worthy of classic fame. Flaxman's monument of *Lord Mansfield*, is considered the best of the kind in England. Canova excelled in the beautiful, as shown in his statues of *Venus*, *Cupid*, and *Psyche;* and his groups of *Venus and Adonis*, and *Cupid and Psyche:* but Thorwaldsen excels also in severer themes, as shown in his statues of *Mars*, and *Adonis*, which first established his fame. His group of the *Graces* is worthy of its author; but that of our *Saviour and the Twelve Apostles*, is doubtless the most remarkable which this art has produced since the days of Grecian glory.

CHAPTER IV.

MUSIC.

Music, is that branch of the Fine Arts, which relates to the production of sounds, regulated according to the principles of melody and harmony. The name is derived from the Greek, μουσικη; which originally included not only music, but poetry and eloquence; or, in a still wider sense, all the arts attributed to the Muses. In common language, the word Music signifies not only the art of composing or performing, but the musical composition or the performance itself. Though its object is frequently mere amusement; it serves other purposes, when used to convey information, or commands, as by the notes of the trumpet or bugle, in war; and, from its power in exciting and expressing strong emotions, it has been introduced and consecrated, in all ages, as a part of divine worship. Its influence, even on the brute creation, proves that it is founded on natural principles; and when rationally cultivated, without neglecting higher duties, it is a pure and noble source of enjoyment.

Music is doubtless an art of extremely ancient origin; and it may have sprung from an imitation of the notes of birds, whose strains it still occasionally aims to copy. According to the Mosaic records, Jubal invented musical instruments, long before the deluge: and when the Egyptians were overthrown in the Red Sea, Miriam, and the other women of Israel, sang, to the notes of the timbrel, songs of praise and exultation. Some writers have supposed the Hebrew music to have been derived from the Egyptians; and it is certain that the lyre and harp, the timbrel or tabor, and pipe or flute, were used in Egypt, in very remote times. The invention of the lyre, which at first had only three strings, is ascribed to the Egyptian Thoth or Mercury; and the harp, of a superior construction, is found pictured in the ancient Sepulchres of the Kings, near Thebes.*

The Greeks ascribed the invention of the pipe to Pan; and that of the flute to Marsyas; but the honor of inventing the lyre, they reserved for Mercury, or Apollo. The number of its strings was increased, they state, by Orpheus, Linus, Thamyris, Amphion or Terpander; and the eighth was added by Pythagoras, to complete the octave; which he is said to have discovered. The Grecian scale of musical sounds, was made up of *tetrachords*, or series of four notes each; the highest being a minor fourth to the lowest: and as the upper tetrachord began with the highest note of the lower, making only seven notes in the two, the eighth note was placed below these seven, and hence called *proslambanomenos*, or the added note. The five modes, called the Dorian, Ionian, Phrygian, Æolian, and Lydian, appear to have designated the pitch, or key note, with which the piece commenced; the last named mode being the highest and softest. The modern *diatonic scale*, is said to have been invented by Ptolemy, the astronomer and geographer; about 130 years after the Christian Era. It is doubtful whether the Greeks understood *counterpoint* or harmony; as their singing appears to have been only a recitative, accompanied by instruments to support the rhythm.

The use of Sacred Music, in the Christian Church, was coeval with its foundation. As early as the first century, the Jewish practice of *antiphonal* singing was adopted by Ignatius, at Antioch; different singers responding to each other, or to the patriarch himself. This practice was introduced in the west, by Ambrose, bishop of Milan, author of the Ambrosian chant. Pope Gregory the Great, about A. D. 600, reformed the style of church music, and established the graver style, with notes of equal length, still preserved in the Gregorian chant. The introduction of the organ in churches, (p. 477), led to the invention of *counterpoint*, or the writing and performing of different parts together, so as to combine harmony with melody. This invention has been ascribed to Guido Aretinus, (of Arezzo), about A. D. 1020; but probably belongs to an earlier age. Guido introduced the musical staff, in which the notes are written both on lines and spaces; and he was the inventor of *solmization*, or the use of certain syllables, to designate the notes of the hexachord, then in vogue. These he selected from a hymn to St. John; using the initial syllables in each hemistich of the following stanza.

" UT queant laxis RESonare fibris
MIra gestorum FAmuli tuorum
SOLve polluti LAbii reatum,
Sancte Johannes."

A seventh syllable, *si* has since been added, it is said, by Maire of Paris, to complete the octave; and the first syllable, *ut* has been changed to *do*, by the Italians. The theory of counterpoint, or harmony, was much improved by Franco of Cologne, about 1050; and

* A brief notice of musical instruments will be found in the chapter on Furniture. (p. 479.

by Palestiina, in 1555, and Monteverde, in 1582. In the fifteenth century, notes were first varied in shape, to distinguish their length or time; but bars were not employed to divide the piece into equal measures, till the beginning of the seventeenth century. The first *opera*, called *Daphne*, the words by Rinuccini, and the music by Jacopo Peri, was composed and performed at Florence, in the year 1598. It was followed, in 1600, by the first *oratorio*, entitled Dell' Anima e del Corpo, composed by Emilio del Cavaliere, partly in imitation of the ancient recitative. The opera differs from the simple drama, in uniting the charms of music to those of poetry; and hence it has been called by the Italians *musica parlante*, or speaking music. The oratorio, consisting of a sacred poem set to music, is, we think, the noblest and grandest of musical productions. As a sequel to the history of Music, a few of the best operas and oratorios will be mentioned in the concluding section of this chapter.

The study of Music, may, we think, be comprised under the heads of Physical Theory of Music; Musical Notation; Musical Composition and Execution; and Musical Productions.

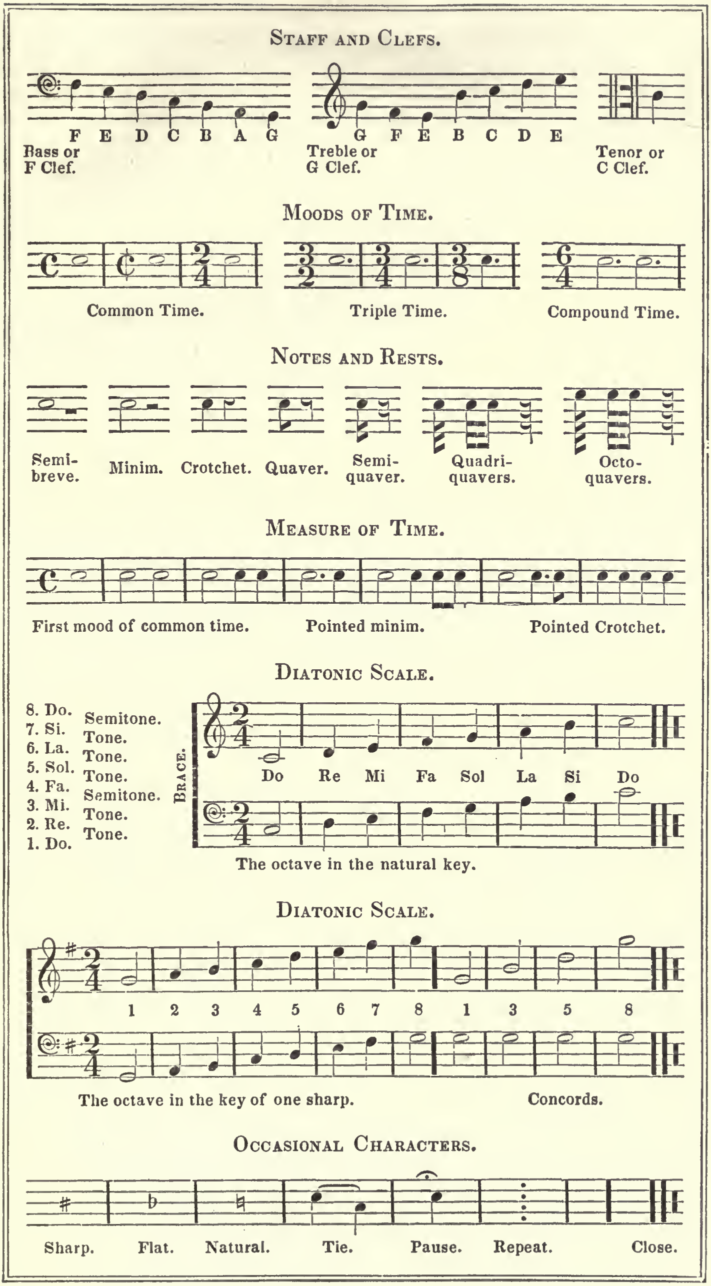
§ 1. The *Physical Theory of Music*, depends upon laws of Acoustics, the statement of which has been reserved for the present place. Music is either a succession, or a combination of sounds: the former producing *melody*, and the latter *harmony*. Musical sounds, or *tones*, are caused by regular vibrations of the particles of the air; which vibrations are transmitted from sounding bodies to the ear. The *grave*, or low tones, are caused by slower vibrations of the air, and are sounded by the longest pipes, or strings, corresponding to the left hand keys of the organ, or piano. The more *acute*, or higher sounds, result from more rapid vibrations, from shorter strings or pipes. The tone of a musical string, depends upon its tension, its diameter, and its length. Hence, if its tension, or tightness, and its diameter continue the same, we may vary its length to produce various tones; and express these tones by means of the lengths to which they correspond: for the number of vibrations in a given time is inversely proportional to these lengths.

Thus, two similar strings, of the same length, will vibrate in equal times, or *unison;* both sounding the same note. But if one of the strings be only half as long as the other, it will vibrate twice as rapidly; and produce a sound called an *octave* above that of the longer string; because this interval is made to comprehend eight notes, including the two in question, in the diatonic scale. If the strings, and consequently their vibrations, be in the ratio of 2 to 3, the resulting interval is called a *perfect fifth:* but the ratio of 3 to 4 gives a *minor fourth;* the two extreme notes, in all these cases, being counted. The ratio of 4 to 5, corresponds to the interval of a *major third;* and the ratio of 3 to 5, or a major third above the minor fourth, gives the interval of the *major sixth.* The ratio of 8 to 9, gives the *major second;* and that of 8 to 15, or a major third above the perfect fifth, gives the *major seventh;* which completes the eight notes of the octave, in the diatonic, or natural scale. In passing from one of these notes to the next, the ratio will be found to vary; showing that they are at unequal intervals, which are commonly distinguished as tones and semitones; the latter occurring between the third and fourth, and the seventh and eighth notes, as above given. It is worthy of remark, that the octave may be subdivided into two equal and similar parts, of 4 notes each.

§ 2. The basis of modern *Musical Notation*, is the *staff*, consisting of five parallel lines, and their intermediate spaces, on which the notes, denoting the sounds, are written. (Plate XII.) Each line, and space, corresponds to some one note of the diatonic scale, and constitutes one degree of the staff. A few more degrees may be added above and below, by means of short lines called *legerlines*. The staff itself may also be made to express a higher, or a lower group of notes, by means of characters called *clefs*. These are the bass, or F clef; the treble, or G clef; and the tenor, or C clef; which last is sometimes used, for the intermediate parts of the harmony. The staves for those parts which are to be performed together, are connected by a *brace*. All the degrees of the scale are named from the first seven letters of the alphabet; their order, in ascending, being A, B, C, D, E, F, G; and, in ascending still higher, they are repeated in the same order; so that all the degrees of the same name are octaves to each other. The bass clef is usually placed on the fourth line, which hence is called F; and then the lowest line of the bass is G: and the treble clef is commonly placed on the second line, which thence becomes G; so that the lowest line of the treble, or air is E; from which the rest of the degrees may be named.

When the diatonic octave, (sometimes termed the eight notes), commences with C, the music is said to be in the *natural key*, or key of C: and, in solmization, this letter is then called *do;* the next above, *re;* the next, *mi;* and so on, as already explained. (p. 532, and Plate XII). The notes in this key, are all sounded by the white keys of the organ or piano; the semitones falling between E and F, and B and C. But when the diatonic octave is made to commence on a higher or lower degree of the scale, some of the degrees require to be sounded either higher or lower by half a tone, corresponding to the black keys of the organ or piano, in order to bring the semitones in their proper place. This is denoted by writing either *sharps*, or *flats*, characters so called, on the degrees which are to be raised or lowered; and these characters, at the beginning of a staff, constitute the *signature:* but their effect may be counteracted by means of another character, called a *natural*.

The time allotted to the music, is divided into equal portions, properly called *measures*, by lines called *bars*, crossing the staff. In *common* time, each measure is divisible into two or four equal parts; in *triple* time, it is divisible into three; and in *compound* time, each primary division of the measure is again subdivided into three equal parts. Notes are varied, in shape and name, to denote the relative times during which they should be sounded. A *semibreve* is as long as two *minims;* or four *crotchets;* or eight *quavers;* or sixteen *semiquavers;* or thirty-two *quadriquavers;* or sixty-four *octoquavers:* and the same relation exists between the different *rests*, or marks of silence. Notes are often connected by a *tie* or *slur*, to denote that they are to be sung to one syllable, or played *legato*, that


STAFF AND CLEFS.
F E D C B A G
Bass or F Clef.
G F E B C D E
Treble or G Clef.
Tenor or C Clef.
MOODS OF TIME.
Common Time.
Triple Time.
Compound Time.
NOTES AND RESTS.
Semibreve.
Minim.
Crotchet.
Quaver.
Semiquaver.
Quadriquavers.
Octoquavers.
MEASURE OF TIME.
First mood of common time.
Pointed minim.
Pointed Crotchet.
DIATONIC SCALE.
8. Do.
7. Si.
6. La.
5. Sol.
4. Fa.
3. Mi.
2. Re.
1. Do.
Semitone.
Tone.
Tone.
Tone.
Semitone.
Tone.
Tone.
BRACE.
Do Re Mi Fa Sol La Si Do
The octave in the natural key.
DIATONIC SCALE.
1 2 3 4 5 6 7 8 1 3 5 8
The octave in the key of one sharp.
Concords.
OCCASIONAL CHARACTERS.
Sharp.
Flat.
Natural.
Tie.
Pause.
Repeat.
Close.

is, slurring them, or gliding smoothly from each to the next. The *dash*, is placed over or under notes which are to be performed *staccato*, or very distinct from each other. The *hold*, is placed over or under notes that are to be prolonged beyond their regular time, and at the pleasure of the performer.

§ 3. The Principles of *Musical Composition* and Execution, are partly arbitrary, depending on taste and fashion; and partly fixed, or founded on the physical theory of music, already explained. We commence this subject by remarking that those notes which, sounded together, produce harmony, would, if sounded in succession, produce melody: because the vibrations which they produce, correspond, or coincide, at certain intervals of time; and this coincidence is, to a certain extent, agreeable to the ear. When the vibrations coincide frequently, they produce a *concord;* but when they concur only at long intervals, they produce a *dissonance*, or in extreme cases a *discord;* which is pleasing occasionally, if sparingly introduced. The first, third, fifth, and eighth notes, of the diatonic octave, produce the most perfect concord; and next to this we may name the first, fourth, sixth, and eighth; and the first, third and sixth; which last concord is the basis of the minor modes, characterized by their sadness and solemnity.

Musical *intervals*, are named from the number of tones and semitones which they comprehend. The *unison*, is termed an interval, although the two notes are sounded precisely alike. The *minor second*, is an interval of one semitone; and the *major second*, an interval of one tone, between the two notes which are sounded together. Both of these intervals are dissonances: and the others are similarly named and distinguished. The study of *thorough bass*, comprehends that of all these intervals and their changes; with the principles which regulate their use, in harmonic composition. Vocal music is also governed by the grammatical rules of accent, emphasis, and cadence, as in reading or speaking. *Voices*, in reference to music, are distinguished as *bass*, *tenor*, and *counter* or alto; the latter being the highest male, or lowest female voices; and *treble*, or soprano, which are the highest voices of females.

§ 4. Of the numerous *Musical Productions* now before the public, we have only room to name a few of the most celebrated operas and oratorios. Piccini wrote numerous operas, of which La Buona Figliuola was extremely popular; and his Dido is considered the best. Cimarosa wrote 120 operas, some of them, as Il Matrimonio Secreto, or the *Secret Marriage*, of superior merit. Of Rossini's operas, Il Tancredi, or *Tancred*, was brought out in 1813, with brilliant success; and was followed by the *Barber of Seville;* La Cenerentola, or *Cinderella;* La Gazza Ladra, or the *Thievish Magpie;* La Donna del Lago, or the *Lady of the Lake;* and several others. Bellini is the author of Il Pirata; La Somnambula; Norma, and two other operas; and Cherubini wrote *Les deux Journées*, or the Two Days, which is deemed a masterly production. The Zauber Flöte, or *Magic Flute*, of Mozart, is highly original and beautiful; Weber's *Der Freyschutz*, or the Free Hunter, is grand and wild; and Meyerbeer's Crociato in Egitto, or *Crusade in Egypt*, is regarded as his best production. Beethoven composed but one opera, *Fidelio*. Auber's *Massaniello*, and Fra Diavolo, and Boieldieu's *Caliph of Bagdad*, and La Dame Blanche, are among the most celebrated operas by the French composers.

Handel wrote several superior operas; but they were all eclipsed by his oratorios; of which the *Messiah* and the *Samson* are considered the best. Next to these sacred compositions we would name Haydn's chief oratorios, the *Creation*, and the *Seasons*, as among the noblest efforts of musical genius. Beethoven's *Mount of Olives*, is also a sublime composition, ranking next to the preceding. Lindpainter's *Seven Sleepers*, is an oratorio of merit, and the last which we have room here to name. The oratorio of *David*, by Neukomm; and that of the *Last Judgment*, by Spohr; are also celebrated productions; though the latter is a subject which we think should have been left to the awful mystery which belongs to it.

CHAPTER V.

ARGICS.

In the branch of Argics, we comprehend a variety of exercises and amusements, not included in the preceding branches; particularly Gymnastics, Calisthenics, and Sedentary as well as Active Games and Sports. The name is derived from the Greek, αργια, leisure, or rest; as the arts here embraced are mostly the employment of leisure hours, devoted to the pursuit of health or amusement. These arts constitute a miscellaneous group, of various tendency: and some discrimination is necessary, in order to separate the baneful from the useful. In general, those amusements which contribute to health, strength, and physical activity, without fostering savage or boisterous passions and habits, are worthy of encouragement; but those which lead to indolent, effeminate or vicious habits and indulgences, should be carefully proscribed, as deleterious both to individuals and to society. The prevalence of such amusements, in all nations and ages, shows their congeniality to our nature; but it does not prove that they are indiscriminately useful or praiseworthy. Even the best of them are liable to abuse, when pursued excessively; and this is one reason, among various others, why their nature and tendency should be understood, and their practice regulated, by those who have the supervision of youth, and the care of public morals.

The name Gymnastics, was first applied, by the Spartans, to those active exercises in which their youth were trained, for the purpose of making them skilful and hardy in war: and the place of training was called a *Gymnasium*. From Sparta, this custom was extended to the rest of Greece; and athletic exercises acquired increased importance, in becoming a part of the celebration of the great national games, or festivals; the Olympic, Pythian, Isthmian, and Nemæan; held in honour of their gods and heroes. Prizes and honors were awarded to those who excelled at these games, until success became so difficult that none but professed *athletæ* appeared as competitors, and the exercises degenerated to mere shows of physical strength and brutality. The early Roman gymnastics were also of a military character; and the taste of the Romans led to the exhibition of still more savage and sanguinary scenes; as the *naumachiæ*, or sea fights, to which slaves and criminals were devoted; or the combats of *gladiators*, often fatal, with wild beasts or with each other. These, perhaps, gave rise to the bull fights of modern Spain.

In the ancient gymnasia, the *palæstra* was that part in which the athletic exercises were performed. Five of these exercises were called by the Greeks *pentathlon*, and by the Romans, *quinquertium;* including leaping, running, wrestling, quoiting, and darting; or in place of the two latter, some writers mention boxing and dancing. Boxing, or the *cæstus*, was a common amusement of the Romans: and in the game called *pancratium*, or all fights, two men, disrobed and unarmed, fought together till one of them yielded, barely escaping with his life. Dancing was in early, and in classic times, made a part of religious festivities; but, unlike the dancing now in vogue, it consisted chiefly in measured movements of individual performers. The chariot race was a favorite sport; and the Greeks, as well as the Romans, set a great value on the art of swimming. With the decline of Roman virtue, the ancient gymnasia degenerated into mere haunts of licentiousness and vice.

In the middle ages, the *tournament* became the favorite amusement; in which knights or cavaliers contended with each other, in the lists, on horseback, and armed with the lance. These festivals originated in France, as early as A. D. 900: and a code of regulations, concerning them, was drawn up by Godfrey de Preuilly, in 1066. With the changes in the art of war, they had already begun to decline, when the death of Henry II., who was mortally wounded in tilting with Count Montgomery, in 1559, led to their abolition in the country which gave rise to them. *Swordsmanship*, including fencing, was also a favorite practice of the middle ages: and *archery* is celebrated in the exploits of Robin Hood and his foresters, in the lawless times of Richard and King John. *Hunting*, has long been a fashionable recreation among the European nobility; and since the days of Izaak Walton, *fishing* may claim an honorable place among the arts of amusement.

A regular system of Gymnastics, was first matured in Germany, by Salzmann, a clergyman, at his school in Thuringia, about the year 1790. The exercises which he taught, were chiefly running, leaping, climbing, balancing, and swimming. The first treatise on Gymnastics, was written by Guts-Muths, who was a teacher in Salzmann's institution. Jahn proposed the general introduction of Gymnasia, with a view to rouse the youth of Germany in the cause of political freedom; but this course led to their suppression, in 1819 or 20. On the subsequent persecution of the liberal leaders, Mr. Völker went to London, and there established the first Gymnasium in England, in 1824: and Dr. Beck, a pupil of Jahn, founded the first Gymnasium in the United States, at Northampton, Mass., in 1825. At about the same time, a system of *Calisthenics*, or exercises for ladies, was introduced in London; but none of these systems has met with general favor in our own country; perhaps, because the exercises have heretofore been too monotonous to preserve their interest.

Of sedentary amusements, or games, the invention of *chess*, is claimed by the Chinese; but, more probably, belongs to Sissa, a brahmin of Hindoostan; and dates back to the fifth century of our era. The object of this invention is said to have been to show the king of the Indies how great was his dependence upon his officers and men; and thus to procure for them a milder treatment. Chess was introduced into Europe by the Crusaders; and has ever been regarded as a scientific game, affording great exercise to the intellectual powers. *Dice* are said to have been invented in Greece, by Palamedes; and they were also used by the Romans; although the use of them in Rome was prohibited by law. *Cards* also, were probably invented in the East; and painted cards were made in Italy as early as 1299: but the manufacture of playing cards, by block printing, originated in Germany, between the years 1350 and 1360. The game of *billiards* originated in France; but at what date, we are not informed.

Our few remarks on Argics, will be distributed under the heads of Field and Water Sports; Gymnastics and Calisthenics; and Games of Chance and Skill.

§ 1. Under the head of *Field and Water Sports*, we include those active amusements which are enjoyed in the open air, and require free space for their enjoyment. Such are riding, driving, rowing, sailing, swimming, skating, running, bathing or playing ball, quoiting, slinging, darting, archery, shooting, hunting, and fishing. Some of these sports may also be practised in the Gymnasium, or hall prepared for this purpose; but they are all, we think, more appropriate for the field or the water. *Riding*, on horseback, is a healthy exercise, generally practised in the open country, and especially serviceable in the operations of war. The rider should sit steadily over the centre of motion of the horse, without pressing too hard upon the sides of the saddle; the feet being turned directly to the front, the toes raised, the shoulders thrown back, the breast advanced, the elbows kept near the sides, and the whole body balanced, and adjusted to the motions of the horse. Both riding and *driving*, whether of several horses, or only one, require a careful study of this noble animal, and the means of managing him with ease and safety.

Rowing, is also a healthy exercise, and very bracing to the arms and chest. It requires a regulated motion of the hands, in order to dip or raise the oar at the proper moment, and then to pull it horizontally, or to carry it back without raising it too high above the water. *Sailing*, is a more dangerous amusement, though not the less fascinating, for that reason; while it is enjoyed with so little effort. *Swimming*, is a healthy and useful exercise; by means of which life is often rescued, though sometimes lost. The human body is lighter than its own bulk of water; and hence, by keeping the nostrils above water, no exertion is necessary merely to prevent submersion and drowning. *Skating*, is perhaps a more exhilarating sport, but one which should be practised only on ice that is known to be firm and continuous. *Running*, which may be practised at all seasons, is one of the best juvenile exercises; and auxiliary to most of the games of *Batting*, or playing ball, the favorite games of boyhood. *Quoiting*, or the tossing of stones, or metallic disks, called quoits; and *Slinging*, or throwing stones by whirling a sling, we think less commendable sports than *Darting*, or hurling the lance, and *Archery*, or practising with the bow and arrows. *Shooting*, with fire arms, is one of the most dangerous amusements, suitable only for men, of mature age, and instructed as to the nature of these weapons. Our chief objection to *Hunting*, and *Fishing*, is the temptation which they hold out to waste time which should be employed in some nobler pursuit.

§ 2. Under the head of *Gymnastics*, and *Calisthenics*, we include those exercises which are suitable for the Gymnasium, or hall of exercise; the former class being intended for young men, and the latter, or Calisthenics, more especially designed for young ladies. Among all these exercises, *Fencing*, or the use of the small sword or rapier, has long been accounted one of peculiar dignity; and it is one producing excellent development of all the muscular powers; although, on account of the uses to which it has been, and may be applied, it may be liable to serious objections. It is usually practised with *foils*, or slender and elastic swords, with buttons on the points; the fencers also wearing wire gauze masks, and thick gloves, to protect themselves from injury. In the common guard, or *carte*, the right foot is thrown forward, the body presented sideways to the antagonist, resting and balancing on the left leg, and inclining a little backward; while the foil, with the point slightly elevated, and directed towards the antagonist, is held in the right hand carried forward and slightly depressed, the palm and nails being turned upward; and the left hand is carried back, and raised to the level of the forehead, to balance the body. In the guard of *tierce*, the position is the same, but the right hand is turned, with the palm inclining downward. We have no room to pursue this subject; nor to speak of the *Broad-sword Exercise*, which indeed belongs more closely to the preceding department, or the Arts of War.

The systematic exercises in Gymnastics, recently introduced in various seminaries, consist in *leaping*, both in length and in height; hopping and *balancing*, on one foot at a time, using the feet alternately; *leaping* with a pole, held in the hands, which are thus exerted at the same time; jumping with a hoop or rope; *vaulting*, or springing over an object by resting the hands upon it; *climbing*, up a pole, or a rope, or a ladder, in the latter case supporting the body by the hands alone; *walking* the rope, or on a horizontal bar, and balancing on the same; *swinging* and seesaw; swinging the *dumb-bells*, which are heavy metallic weights; and pulling, pushing, lifting, or carrying heavy bodies. In these, and similar exercises, provision should be made, as far as possible, for avoiding danger; and they should not be taken immediately after eating, nor too violently at the commencement. Of *wrestling*, and *boxing*, we think less favorably; and we regard field sports as preferable to those of the hall, whenever they are equally accessible: but we will venture to add the opinion, that the same amount of exercise, devoted to some of the active arts, as turning, planing, cabinet making, forging and filing, machine making, farming, or gardening, would be alike beneficial to persons of sedentary habits, and far more productive. Of *Calisthenics*, or exercises for young ladies, we would particularly recommend *dancing;* which, in the social circle, is, we think, alike graceful and healthy; though its practice in crowded halls, and at late hours, is doubtless in many ways injurious.

§ 3. Of *Games of Chance*, and *of Skill*, the most scientific and interesting, is that of *Chess;* which is played by two persons, on a board divided into 64 squares, painted alternately black and white; the board being so placed that each player may have a white square on the right hand, in the row which is nearest to him. Each player has eight pieces, besides eight pawns; which, at the commencement of the game, are placed in a certain order; those of the different sides being distinguished by their colors. The *white queen* is placed on the central white square of one side, the *king* being on her left. The two pieces called *bishops*, are placed next to the king and queen; the *knights* next to these; and the *castles*, or rooks, occupy the corners. The *black queen* is placed on the central black square; the black king being on her right; and the pawns are placed in the second row on each side. The pawns can only be moved forward, either one or two squares at their first move, and then one square at a time; and they can take the opposite pieces only by moving obliquely forward. The knights move obliquely, three squares at a time; the bishops obliquely, forward or backward; the castles directly, forward, backward, or sideways; and the queen has the moves either of the bishop or the castle, moving, like them, as far as she pleases, if the board be free. The king moves in every direction; but only one square at a time, except in *castling*, or displacing one of the antagonist castles.

If a frequent indulgence in the game of chess be an unjustifiable waste of time, how much more so must be those games of mere chance, which serve only to consume the fleeting hours of life, and leave no returns of health, usefulness, or improvement; but rather bear with them to eternity the stamp of self-condemnation. Such are games of *cards*, and of *dice;* which are alike pernicious and dangerous, as the avenues to effeminacy and dissipation, to gambling, drinking, and all their train of vices: while the poor victim imagines that he is only indulging in a little harmless amusement, till the chains are forged and fastened upon him, which shall drag him down to temporal if not eternal perdition. Some of these games may be interesting, as matters of curiosity, or ingenuity; but a practical knowledge of them, we must regard as one of the most dangerous and disparaging acquirements which a young man can possibly make. If a perusal of the present work has not suggested many sources of amusement, equally recreative, and incomparably more laudable than any of these games, then has the labor here bestowed fallen far short of the writer's object; the moral as well as intellectual profit of all his readers.

APPENDIX.

BIBLIOGRAPHY.

A SELECT CATALOGUE OF BOOKS ON ALL THE BRANCHES OF HUMAN KNOWLEDGE.

In the following list, an attempt has been made to aid the purchaser and reader in the choice of books. Their number is so great, and their merits are, in many cases, so nearly equal, that to make a selection would be difficult, even for a person well acquainted with them all. The writer can, therefore, only hope that this catalogue will be found to contain a large proportion of valuable works; and that its greatest faults may be remedied hereafter, should a new edition be called for. In order to give some idea of the extent of the works enumerated, the number of volumes is generally designated by the letter v.; and the size of each is marked by a numerical abbreviation of the words folio, (2io.;) quarto, (4to.;) octavo, (8vo.;) duodecimo, (12mo.;) and octodecimo, (18mo.;)—the reference being generally to the American, or to the later foreign editions. The present work is of the common octavo size, as explained, p. 521. The order of subjects here adopted is the same as in the preceding part of the work. (p. 37.) The writer is happy to acknowledge his obligations to Judah Dobson, Esq., of Philadelphia, for the names of several recent and valuable works, which would otherwise have been inadvertently omitted in the following list. Mr. Dobson's extensive agencies in the procurement of foreign as well as domestic publications, have afforded him peculiar facilities in bibliographical researches, which none could have more successfully pursued.

PANTOLOGY.

Wilbur's Lexicon of Useful Knowledge, for Schools, 1 v. 12mo.; *Enfield's* History of Philosophy, 2 v. 4to.; *Tenneman's* History of Philosophy, 1 v. 8vo.; *Morell's* History of Philosophy and Science, 1 v. 8vo.; *Ampère's* Philosphie des Sciences, 1 v. 8vo; *The Encyclopædias*, (see p. 27); The Library of *Useful Knowledge*, in numbers, 8vo.; Harper's *Family Library*, in numbers, 18mo. The *Transactions* and *Memoirs* of Learned Societies, (p. 22,) are important and extensive sources of general information. Of *Periodicals*, relating to knowledge in general, we can only name the Edinburgh, Quarterly, Foreign Quarterly, and Westminster Reviews, Jamieson's Edinburgh Philosophical Journal, and the London and Edinburgh Philosophical Magazine; and, in our own country, the North American and New York Reviews, the Southern Literary Messenger, the Journal of the Franklin Institute, and Silliman's Journal of Science.

GENERAL BIBLIOGRAPHY.*

Horne's Introduction to the Study of Bibliography, 2 v. 8vo.; *Taylor's* Transmission of Ancient Books to Modern Times, 1 v. 8vo.; *Eschenberg's* Manual of Classical Literature, 1 v. 8vo.; *Schoell's* Histoire de la Littérature Grecque, 8 v. 8vo., or 4 v. 12mo.; *Schoell's* Abrégée de la Littérature Romaine, 4 v. 8vo., and abridged in 1 v. 8vo.; *Dunlop's* Roman Literature, to the Augustan Age, 2 v. 8vo.; *Hal-*

* Relating to books on all subjects.

lam's Introduction to the Literature of Europe, 2 v. 8vo.; *Barretti's* Italian Library, 1 v. 8vo.; *Anaya's* Essay on Spanish Literature, 1 v. 12mo.; Bouterwek's Spanish and Portuguese Bibliography, 2 v. 8vo.; *Brunet's* Manuel du Libraire, 4 v. 8vo., and Supplement, 3 v. 8vo.; *Ventouillac's* French Librarian, 1 v. 8vo.; *Ersch's* Handbuch der Deutschen Literatur, 4 v. 8vo.; *Lowndes'* Bibliographer's Manual, 4 v. 8vo.; *Goodburgh's* Library Manual, 1 v. 8vo.; *Watt's* Bibliotheca Britannica, 4 v. 4to. See also *Catalogues of Libraries*, (p. 25).

FIRST PROVINCE—PSYCHONOMY.

General Works.—*Kames'* Sketches of the History of Man, 2 v. 8vo.; *Cudworth's* Intellectual System of the Universe, 2 v. 8vo.; *Ray's* Synopsis of Philosophical, Political, and Theological Systems, 1 v. 8vo.; *Aristotle's*, *Plato's*, and *Cicero's* Philosophical Works.

I. DEPARTMENT—GLOSSOLOGY.

General Works.—*Priestley's* Theory of Language and Universal Grammar, 1 v. 12mo.; *Harris'* Hermes, 1 v. 8vo.; *Jamieson's* Hermes Scythicus, 1 v. 8vo.; *Beattie's* Theory of Language, 1 v. 8vo.; *Tooke's* Epea Pteroenta, or Diversions of Purley, 2 v. 8vo.; *Arnold et Launcelot's* (Port Royal) Grammaire Générale et Raisonnée, 8vo.; (*De Brosse's*) Formation Mechanique des Langues, 2 v. 8vo.; *Murray's* History of European Languages, 2 v. 8vo.; *Hervas*, (see p. 41); *Adelung* and *Vater's* Mithridates, (see do.); *Fry's* Pantographia, (on alphabetic characters,) 1 v. 8vo.; *Barnard's* Polyglot Grammar, 1 v. 8vo.

Oriental Languages.—*Calepinus'* Lexicon XI. Linguarum, 1 v. 2io.; *Champollion*, *Wilkinson*, and *Young*, on the Coptic, and Hieroglyphics; *Hottinger's* Grammatica Chald. Syriac. Hebr. et Arabica, 1 v. 4to.; *Schindler's* Lexicon Pentaglotton, 1 v. 2io., and *Castell's* Lexicon Heptaglotton, 2 v. 2io., both on the Shemitic Languages; *Nordheimer's* Hebrew Grammar, 2 v. 8vo., and *Stuart's*, 1 v. 8vo.; *Gesenius'* Hebrew Lexicon, tr. by Robinson, 1 v. 8vo.; *Frey's* Hebrew Grammar, 1 v. 8vo., and Dictionary, 2 v. 8vo.; *Erpenius'* Grammatica Syriaca, 1 v. 4to.; *Erpenius'* or *Paulus'* Grammatica Arabica, 1 v. 4to. or 8vo.; *De Sacy's* Grammaire Arabe, 2 v. 8vo.; *Richardson's* Persian and Arabic Dictionary, 2 v. 4to.; *Wilmet's* Lexicon Ling. Arabicæ, 1 v. 4to.; *Freytag's* Lexicon Arabico-Latinum, 4 v. 4to.; *Ludolf's* Ethiopic Grammar, and Dictionary, each 1 v. 2io.; *Meninski's* Thesaurus Ling. Arab. Pers. et Turcicae, 2 v. 2io.; *Sir W. Jones'* Persian Grammar, 1 v. 4to.; *David's* Grammar of the Turkish Language, 1 v. 4to.; *Wilkins'* Grammar of the Sanscrit, 1 v. 4to; *Wilkins'* Sanscrit Dictionary, 1 v. 4to.; *Carey's* Grammar of the Bengalee, 1 v. 8vo., and Beng. Dictionary, 1 v. 8vo.; *Roebuck's* Hindostannee Grammar, &c., 1 v. 12mo.; *Taylor* and *Hunter's* Hindostannee Dictionary, 1 v. 8vo.; *Morrison's* Chinese Grammar, 1 v. 4to., and Chinese Dictionary, 2 v. 2io.; *De Guignes'* Dictionnaire Chinois, 1 v. 2io.; *Taberd's* Dictionnarium Anamitico-Latinum, 2 v. 4to.; *Duponceau* on the Cochin Chinese Language, 1 v. 8vo.

European Languages. *Pelasgic or Southern.—Hachenberg*, *Goodrich*, *Fisk*, *Anthon*, and *Wylie's* Greek Grammars; *Stuart's* New Testament Greek Grammar, 1 v. 8vo.; *Buttman's* Greek Grammar, tr. by Everett, and by Robinson, 1 v. 8vo.; *Stephanus'* Thesaurus Græcæ Linguæ, 4 or 10 v. 2io.; *Schrevelius'* Lexicon-Græcco Latinum, 1 v. 8vo.; *Donnegan's* Greek and English Dictionary, 1 v. 8vo.; *Robinson's* New Testament Greek and English Lexicon, 1 v. 8vo.; *Adams'* Latin Grammar, ed. by Gould and by Fiske, 1 v. 12mo.; *Andrews* and *Stoddard's* do., 1 v. 12mo.; *Facciolati* and *Forcellini's* Lexicon Totius Latinitatis, ed. by Bailey, 2 v. 4to.; *Ainsworth's* Latin Dictionary, 1 v. 8vo.; *Leverett's* do., 1 v. 8vo.; *Bachi's* Italian Grammar, 1 v. 12mo.; *Baretti's* Italian Dictionary, 2 v. 8vo.; *Petronj* and *Davenport's* do., 2 v. 8vo.; *Diccionario* della Crusca, 4 v. 2io.; *Cubi's* Spanish Grammar, 1 v. 12mo; *Newman* and *Barretti's* Spanish Dictionary, 2 v. 8vo.; *Dictionary* of the Spanish Academy, 1 v. 2io.; *Castro's* Portuguese Grammar, 1 v. 8vo.; *Vieyra's* Portuguese Dictionary, 2 v. 8vo.; *Levizac's* French Grammar, 1 v. 12mo.; *Berard's* French Grammar, 1 v. 8vo.; *Boniface's* French Dictionary, 2 v. 8vo.; *Boiste's* Dictionnaire, 1 v. 4to.; Dictionnaire de l'Academie Française, 2 v. 4to.

Gothic and Northern Languages.—*Webster's*, *Cobb's*, and *Emerson's* Spelling Books; *Kirkham's*, *Comly's*, *Greenleaf's Brace's*, and *Smith's* Grammars for Schools;* *Murray's* English Grammar, 1 v. 8vo.; *Johnson's* Dictionary, 2 v. 4to., and 1 v. 8vo.; *Webster's* Dictionary, 2 v. 4to., and 1 v. 8vo.; *Worcester's* Johnson, Walker, and Todd, combined, 1 v. 8vo.; *Worcester's* Dictionary, 1 v. 12mo.; *Crabb's* English Synonyms, 1 v. 8vo; *Bosworth's* Anglo-Saxon Dictionary, 1 v. 8vo.; *Jamieson's* Dictionary of the Scottish Dialect, 1 v. 8vo.; *Evans'* Welsh Vocabulary, 1 v. 12mo.; Irish Dictionary, Paris, 1768, 1 v. 4to; *Janson's* Dutch Grammar, 1 v. 12mo.; *Bailey's* Dutch Dictionary, 1 v. 8vo.; *Follen's*, Schade's, or Bernay's German Grammar, 1 v. 12mo.; *Ehrenfreid's* German Phrases, 1 v. 12mo.; *Flügel* and *Sporschil's* German Dictionary, 2 v. 8vo.; *German Dictionary*, pub. by Mentz, of Philadelphia, 1834, 2 v. 8vo.; *Adelung's* Worterbuch, 7 v. 4to.; *Lange's* Dänische Sprachlehre, 2 v. 12mo.; *Wolff* and *Berthelson's* Danish Dictionary, 1 v. 4to.; *Sahlstedt's* Schwedische Grammatik, 1 v. 12mo.; *Sahlstedt's* Dictionarium Suecicum. 1 v. 4to.; *Maudru's* Elemens de la Langue Russe, 2 v. 8vo.; *Weisman's* Lexicon, German, Latin, Russian, with a Russian Grammar, 1 v. 4to.; *Bandtke's* Polish Grammar, and Polish Dictionary, each 1 v. 8vo.

Barbarous Languages.—*Roger Williams'* Key to the Language of the Indians of New England, (Mass. Hist. Coll., vol. 3); *Eliot's* Grammar of the Mass. Indian Language, 1 v. 8vo.; *Gallatin's* Indian Vocabulary, 1 v. 8vo.; *Pickering* on the Orthog. of the Indian Languages, (Mem. Am. Acad. Sciences); *Duponceau's* Report on the Languages of the Am. Indians, 1 v. 8vo.; *Say's* Vocabularies of Indian Languages, 1 v. 8vo.; *Zeisberger's* Delaware Indian Spelling Book, 1 v. 12mo.; the Yaloff (African) Vocabulary, 1 v. 8vo. For other Barbarous Languages, see the Publications of the Roman Propaganda.

II. DEPARTMENT—PSYCHOLOGY.

General Works.—*Baxter's* Inquiry into the Nature of the Human Soul, 2 v. 8vo.; *Kirwan's* Metaphysical Essays, 1 v. 8vo.; *Bentham's* Table of the Springs of Action, 1 v. 8vo.; *Scott's* Letters on Demonology and Witchcraft, 1 v. 12mo.; *Kames'* Elements of Criticism, 1 v. 8vo., and Frost's School edition, 1 v. 12mo.

Rhetoric.—Newman's, or Lacy's Rhetoric, for Schools; Comstock's, or Lacy's Elocution, 1 v. 12mo.; Jamieson's Rhetoric, 1 v. 12mo.; *Walker's* Grammar of Rhetoric, 1 v. 8vo.; *Aristotle's* Rhetoric, 1 v. 12mo.; *Cicero* De Oratore, tr. by Guthrie, 1 v. 8vo.; *Quintilian's* Institutes, 1 v. 8vo.; *Longinus* on the Sublime, 1 v. 8vo.; *Campbell's* Philosophy of Rhetoric, 2 v. 8vo.; *Blair's* Lectures on Rhetoric and Belles Lettres, 1 v. 8vo.; *Whateley's* Elements of Rhetoric, 1 v. 12mo.; *Alison's* Essays on the Nature and Principles of Taste, 8vo.; *Burke's* Inquiry into the Sublime and Beautiful, 1 v. 12mo.; *Rush* on the Voice, 1 v. 8vo.

Logic.—Jamieson's, or Hedge's Logic, for Schools; *Hinds'* Logic, 1 v. 12mo.; *Aristotle*, Excerpta ex Organo, 8vo.; *Bacon's* Novum Organon Scientiarum, tr. by Shaw, 2 v. 12mo.; *Wolfius'* Logic, from the German, 8vo.; *Watts'* Logic, or the Right Use of Reason, 2 v. 8vo., and his Improvement of the Mind, 1 v. 12mo.; *Bentham's* Book of Fallacies, 8vo.; *Whateley's* Elements of Logic, 1 v. 12mo.; *Malebranche's* Search after Truth, 2io.

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* We object to the phrase *you was*, found in at least one of the above grammars, as being incorrect. If the plural pronoun *you* is addressed to a single person, by way of compliment, the plural form of the verb should be retained, for the same reason; and it should be *you were*, in both numbers.

Ethics.—Sullivan's Moral Class Book, or Lacy's Moral Science, for Schools; *Aristotle's* Ethics, (and Politics,) 2 v. 8vo.; *Cicero* De Officiis, and De Senectute, (on Duties, and Old Age,) various translations; *Seneca's* Morals, by Estrange, 1 v. 12mo.; *Beattie's* Elements of Moral Science, 2 v. 8vo.; *Smith's* Theory of the Moral Sentiments, 1 v. 8vo.; *Bentham's* Introduction to Morals and Legislation, 1 v. 4to.; *Paley's* Moral and Political Philosophy, 1 v. 12mo.; *Abercrombie's* Philosophy of the Moral Feelings, 1 v. 12mo.; *Wayland's* Elements of Moral Science, 1 v. 12mo.; *Oliver's* Hints on the Pursuit of Happiness, 1 v. 8vo.; *Wardlaw's* Christian Ethics, 1 v. 8vo.; *Mackintosh's* Progress of Ethical Philosophy, 1 v. 8vo.; *Jouffroy's* Philosophie Morale, 1 v. 8vo.; Bp. Butler's Sermons at the Chapel of the Rolls, 1 v. 8vo.

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III. DEPARTMENT—NOMOLOGY.

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Political Philosophy.—(See Ethics.) *Burlamaqui's* Principles of Natural and Political Law, 2 v. 8vo.; *Montesquieu's* Spirit of Laws, 2 v. 8vo.; *Cataneo's* Source, Strength, and True Spirit of Laws, 1 v. 8vo.; *Ferguson's* History of Civil Society, 1 v. 8vo.; *Lieber's* Legal and Political Hermeneutics, 1 v. 12mo.; *Sutherland's* Congressional Manual, 1 v. 18mo.; *Jefferson's* Manual of Parliamentary Practice, with a copious Index, 1 v. 18mo.; *Branche's* Principia Legis et Equitatis, 1 v. 8vo.; *Beccaria* on Crimes and Punishments, 1 v. 12mo.; *De Tocqueville's* Democracy in America, 2 v. 8vo.; *Coleridge's* Statesman's Manual, 1 v. 12mo.; *Story's* Commentary on the Conflict of Laws, 1 v. 8vo.

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Mansfield's Political Grammar, or *Bayard's* Brief Exposition of the Constitution, 1 v. 12mo.

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MOHAMEDANISM.—Sale's Translation of the Koran, 2 v. 8vo.; *Maracci's* Refutatio Korani, published with the Arabic Koran, 1 v. 2io.; *Bobovius* on the Turkish Liturgy, 8vo.; *Prideaux'* Life of Mahomet, 1 v. 8vo.; *Bush's* Life of Mohammed, 1 v. 18mo., (Fam. Library;) *Mill's* History of Muhammedanism, 8vo.; *Taylor's* History of Mohammedanism, 12mo.; *Forster's* Mahometanism Unveiled, 2 v. 8vo.

JUDAISM.—Biblia Hebræa, Michaelis, Vanderhooght's, or Hahn's edition; Talmud Babylonicum, 12 v. 2io.; (see p. 144); *Warburton's* Divine Legation of Moses, 4 v. 8vo.; *Lightfoot's* Horæ Hebraicæ, 1 v. 8vo.; *Reland's* Antiquitates Sacræ Vet. Hebræorum, 4to.; *Lewis'* Origines Hebrææ, 4 v. 8vo.; *Josephus'* Jewish Antiquities and Wars, 1 or 2 v. 8vo.; *Jenning's* Jewish Antiquities, 2 v. 8vo.; *Jahn's*

Hebrew Commonwealth, and his Biblical Archaeology, each 1 v. 8vo.; *Prideaux's* Connection of the Old and New Testament, 2 v. 8vo.; *Turner's* Sacred History, and *Milman's* History of the Jews, 3 v. 18mo., (Family Library;) *Isaac's* Ceremonies, &c., of the Jews, 8vo.; *Levi's* Ceremonies, and Account of the Mishna, 1 v. 8vo.; *Johlson's* Instruction in the Mosaic Religion, 8vo.; *Levi's* Prayers used by the Polish and German Jews, 6 v. 8vo.; *Pinto's* Prayers of the Spanish and Portuguese Jews, 2 v. 4to.; *Allen* on Modern Judaism, 1 v. 8vo.

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Biblical Divinity.—The Bible. (See *Marsh's* History of Translations of the Scriptures, 4 v. 8vo.); *De Rossi's* Variae Lectiones Veteris Testamenti, 5 v. 4to.; *Patrick*, Arnald, Lowth, Whitby, and Lowman's Critical Commentary, 6 v. 4to.; *Scott's*, *Henry's*, or *Clark's* Commentary; *Jenks'* Comprehensive Commentary, (chiefly Henry's,) 5 v. 8vo.; *D'Oyly* and *Mant's* Commentary, Hobart's edition, 2 v. 4to.; Critici Sacri, 5 v. 2io.; *Poli* Synopsis, 5 v. 2io.; *Calmet's* Dictionary of the Bible, 5 v. 4to., or Robinson's Abridgment, 1 v. 8vo.; *Gaston's* Collections of Pertinent Texts, 1 v. 8vo.; *Horne's* Introduction to the Holy Scriptures, 4 or 2 v. 8vo.; *Harris'* Natural History of the Bible, 1 v. 8vo.; Brown's, Butterworth's, or Cruden's Concordance; *Ernesti's* Elements of Interpretation, 1 v. 12mo.; *Newton* on the Prophecies, 2 v. 8vo.; *Lowth's* Sacred Poetry of the Hebrews, 2 v. 8vo.; *Doddridge's* Family Expositor of the New Testament, 6 or 1 v. 8vo.; *Bloomfield's* Notes, 2 v. 12mo.; *Barnes* on the Gospels, 2 v. 12mo.; *Hodge* on Romans, 1 v. 8vo.; *Stuart* on Hebrews, 1 v. 8vo.; *Macknight* on the Epistles, 1 v. 8vo.*

Apologetic Theology.—*Paley's* Natural Theology, 1 v. 12mo.; *Butler's* Analogy of Religion, Natural and Revealed, 1 v. 8vo. or 12mo.; the Bridgewater Treatises, 12mo. or 8vo.; *Paley's* Evidences of Christianity, 1 v. 8vo.; *Leslie's* Short and Easy Method with the Deists, 1 v. 8vo.; *Lardner's* Credibility of the Gospel History, 10 v. 8vo.; *Watson's* Apology for the Bible, 1 v. 18mo., and for Christianity, 1 v. 12mo.; *Sumners'* Evidence of Christianity from its Nature, 1 v. 12mo.; *Soame Jenyn's* Internal Evidence, 1 v. 8vo.; *Keith's* Demonstration, and Evidence from Prophecy, each 1 v. 12mo.; *Campbell* on Miracles, 1 v. 12mo.; *Paley's* Horæ Paulinæ, 1 v. 8vo.; *Dick* on Inspiration, 1 v. 12mo.; *Verplanck's* Essays on the Evidences, 1 v. 8vo.; *Wilson's* Evidences, 1 v. 8vo.; *Leland's* View of Deistical Writers, 2 v. 8vo.

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* In *Patristic Theology*, we can only mention *Wake's* Apostolical Fathers, 1 v. 8vo.; *Reeves'* Apologies, 2 v. 8vo.; and the Library of the Fathers, now in progress. (See p. 149.)

...... The Roman Breviary and Missal, each 1 v. 12mo. or 18mo.; Concilii Tridentini Decreta, 1 v. 12mo.; *Father Paul's* (Sarpi's) Council of Trent, 2 v. 4to.; *Milner's* End of Religious Controversy, 1 v. 8vo.; *Barrow* on the Pope's Supremacy, 1 v. 8vo.; *Bp. Gibson's* Preservative against Popery, 3 v. 2io.; *Bp. Taylor's* Dissuasive from Popery, 1 v. 8vo.; *M'Gavin's* Protestant, 2 v. 8vo.; *Edgar's* Variations of Popery, 1 v. 8vo.; and *Bossuet's* Histoire des Variantes, 4 v. 8vo.; Essays on Romanism, 1 v. 12mo. ...... *Scott's* Luther and the Lutheran Reformation, 2 v. 12mo. ...... The Book of Common Prayer of the Pr. Episcopal Church; Homilies to be read in Churches, 1 v. 8vo.; *Collier's* Eccl. History of Great Britain, 9 v. 8vo.; *Jewell's* Apology, 1 v. 12mo.; and *Hobart's* Apology, 1 v. 8vo.; *Southey's* Book of the Church, 1 v. 8vo.; *Hooker's* Eccl. Polity, 3 v. 8vo.; *Potter* on Church Government, 1 v. 8vo.; *White's* Comparative View, 2 v. 8vo. ...... *Bogue* and *Bennett's* History of Dissenters, 4 v. 8vo. ...... Confession of Faith of the Presbyterian Church in the U. S., 1 v. 18mo.; *Calvin's* Institutes, 3 v. 8vo.; *Knox's* Reformation in Scotland, 1 v. 8vo.; History of the Westminster Assembly, 1 v. 12mo.; *Dick's* Lectures on Theology, 2 v. 8vo.; *Ridgeley's* Body of Divinity, 1 v. 8vo.; *Miller* on the Ministry, 1 v. 8vo. ...... The Cambridge and Saybrook Platforms, 1 v. 12mo.; *Neal's* History of the Puritans, 5 v. 8vo.; *Dwight's* Theology, 5 v. 8vo. ...... The Baptist Confession of Faith, 1 v. 18mo.; *Hinton's* History of Baptism, 1 v. 12mo.; *Gill's* Body of Divinity, 1 v. 8vo.; *R. Hall's* Works, 3 v. 8vo.; *A. Fuller's* Works, 2 v. 8vo. ...... The Doctrines and Discipline of the Methodist Episcopal Church, 1 v. 18mo.; *Bangs'* History, 3 v. 12mo.; *Watson's* Theological Institutes, 2 v. 8vo.; *Wesley's* Works, 7 v. 8vo.; *J. Fletcher's* Works, 4 v. 8vo. ...... *Channing's* Writings on Unitarianism; Unitarian Tracts, 8 v. 12mo.; *Priestley's* Writings; and *Bp. Horsley's* Tracts, in reply. ...... *Ballou's* Writings on Universalism; Universalism as it is, 1 v. 8vo. ...... *Barclay's* Apology for the Quakers, 1 v. 8vo. ...... *Swedenborg's* Writings.

SECOND PROVINCE.—ETHNOLOGY.

Collier's Historical, Geographical, Genealogical, and Poetical Dictionary, 4 v. 2io. (London, 1727;) *Bigland's* Geographical and Historical View of the World, 5 v. 8vo.; *Lavoisne's* Complete Genealogical, Hist. Chronol. and Geographical Atlas, 1 v. 2io. (Phil. 1820,) and the American Supplement, 1 v. 2io; *Alcedo's* Dictionary of Geography, History, &c. 5 v. 4to.; *McCulloch's* Geograph. Statist. and Historical Dictionary, 1 v. 8vo.; *Lempriere's*, or *Anthon's* Classical Dictionary, each 1 v. 8vo.

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* We regret to see that Von Rotteck's General History of the World, 4 v. 8vo., recently published, though in some respects valuable, rejects the Mosaic Scriptures as fabulous.

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